March-April 2000

Issue 89

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Australian Model Engineering

LOCOMOTIVES, TRACTION & STATIONARY ENGINES, BOATS, WORKSHOP, PRODUCTS, CLUB NEWS & EVENTS, REVIEWS

In This Issue:
- ☑ WAGR S Class 4-8-2 Loco in 7¼" Gauge
- ☑ Photo Etch your own Name Plates
- ☑ Convention 2000 — Blenheim NZ

Print Post Approved, Publication No. PP228582/00001

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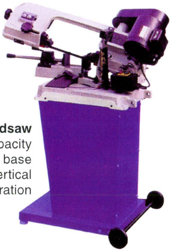

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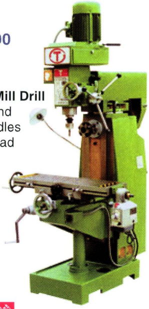

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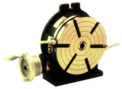
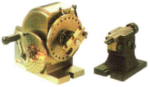
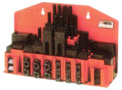


Rotary Table



Dividing Head



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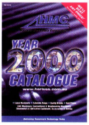

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March-April 2000 Issue 89

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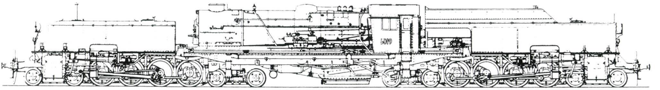
Front cover

Colin Brittenden of Christchurch is building this award-winning 2" scale Atkinson 3-way tipping steam truck, photographed at Blenheim's Convention 2000. For a full report on the Convention turn to page 30. Photo: David Proctor



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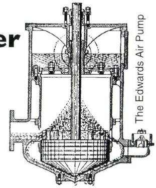
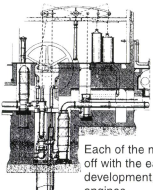
The Pump by S.C. Walker



The Edwards Air Pump



Ottobourne Pumping Engine of 1888

The Pump
by S.C. Walker
This book was published in 1995 as a history of pumping along with a history of its application in domestic water supply. Having said that, it can also be said that it is a history of the Steam engines. The first steam engine drove a pump, and the development of the steam engine followed the development of the pump closely. Each of the steam engines are described in as much details as their associated pumps.

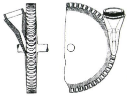
Each of the major mile stones in pumping are covered, as well as all the major modern pumps. The book starts off with the early pumps from Egypt 3000 to 4000 years ago, it then goes through to the next major development, the simple beam engine, Newcomen atmospheric engines, along with Watt & Cornish Beam engines.

Compound beam engines, "in-line" compound engines and then the rotating beam engines are covered. The development of the crank and its effect on engine and pump design is covered.

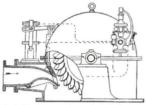
Other related subjects are detailed, including Myer's valve gear, Corliss valve gear, Edwards air pumps, uniflow engines. Also Rotodynamic pumps explained, along with turbine drive, electric drive.

Some miscellaneous pumps that are mentioned include windmill powered, diaphragm pump, helical pump, pulsometer pump, hydraulic ram pumps, compressed air and steam lift pumps, I.C. engine drives, Humphry pumps, mono pumps, univac pump, etc.

As well as pumps, the development of pipes from early wood and stone pipes to the wide variety of modern pipes are detailed.



De Laval Wheel and Nozzle



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Comment

Fortunate Influences

The romance of a railway system, in my opinion, is a train hauled by a steam locomotive with typical period passenger coaches or goods wagons. What does add to the realism of a preserved railway in this part of the 20th century is when the staff dresses in period uniforms. When we make a model of a railway we try to add to the realism by making every item to scale with as much detail as possible and typical of the period. When we add model engineering to the pot, we not only make the model to scale, with every detail possible but the finished product works just the same way as the original. After I had my first steam locomotive on the track I found that if I had done this or that differently it would be better. So slowly I have been adding to, changing, improving, remaking parts etc. all to satisfy me. Model engineering in steam. Simple energy from boiling water.

At one time I was asked, "What model are you going to build next?" Various models were discussed but not making any commitment, I made a comment in passing like "I have made a 5" loco, I think I might make a $7^{1}/_{4}$" next" and left it at that. Later that day, I was taken aside by a white haired club member who said to me, "It takes engineering skill in making model steam locomotive to a smaller scale". That short statement has profoundly influenced my thinking. I now think, "Bigger isn't necessarily better. To make a large locomotive isn't model engineering it's commercial engineering." So I decided that I would stick with 5" gauge.

The next influence on my thinking came from a shortish club member, who said, "Mr. Jones, you won't be comfortable driving a locomotive sitting on a tender. You are better to stick to a driving truck like you have now." Sure, I'm big but he was right. Later I was given the opportunity to drive several locomotives, all 5"gauge models, all $1^{1}/_{16}$" or $1^{1}/_{8}$" to the foot with either "one bummers" or sitting on the tender. I didn't fit too well. The *Blowfly* I have now is approximately 2" to the foot and anything I make for it is based on this scale. The same shortish Club member also said (and he does have a lot of words to say), "You keep talking about Puffing Billy. Why don't you build a NA? It'll make a beautiful model". He then proceeded to tell me about Ian Davies or Ted O'Brien and their NAs. How they had to bend the locking handles down on the 5" turntable to clear the cylinders. He said, "They're still bent and ready for you."

The final influence was the desire to be made to "think". The plans available for the NA appear to be copies of the originals in 12" to the foot scale. There are 17 drawings available plus a general arrangement. I suppose the plans are all general arrangements but with more detail. Being a Baldwin design allows for fabrication of most of the components. They are not step by step drawings so that if you make it this shape and size, it will fit. There aren't castings readily available to just turn or mill to the desired shape. You have to "think". The best part is the design is a little more complex than a *Blowfly* but not as complicated as say a C36 / C38 could be to detail properly.

So that is how I made my decision about my next project. It's steam, it's a 5" loco with a scale of 2" to the foot (into which I fit) and I will have to make everything. It will probably take the next 10 years or so to finish. Most importantly it's a practical size. It will look like the original and I hope it will perform as well as the original did, using steam.

Brian Jones *(Lake Macquarie L. S.)*

Join us in a great hobby!

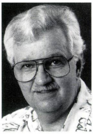
If this is your first issue of *Australian Model Engineering*, welcome!

In successive issues we cover many topics centred on that wonderful process of model engineering — alias *tinkering*.

If you're new to model engineering as well as to our magazine, you'll benefit from getting together with other model engineers — we're good at sharing ideas and saving each other money! If you don't have any contacts, start by looking in Club Roundup to find a club that's near to you. Many of our readers have discovered people with similar interests literally just around the corner.

Helping other model engineers is the simple idea of the volunteers behind this magazine. Our readers write items for us — for the same (non-existent) rate of pay! If you have ideas, opinions or techniques that you feel would be interesting to others (especially from the newcomer's angle), please drop us a line. We can send you a useful guide and help with preparing artwork or editing.

I hope you'll enjoy the great fellowship that makes our hobby special, and that you'll support our advertisers — after all, they help pay our bills!



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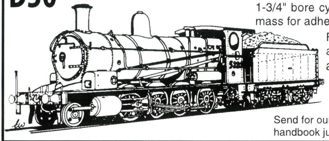

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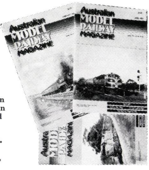

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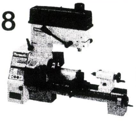

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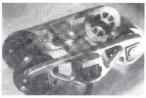

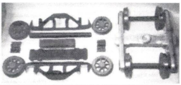

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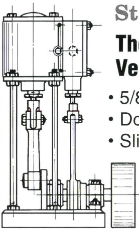

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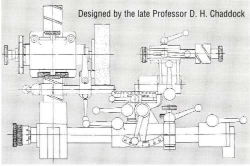

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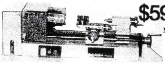

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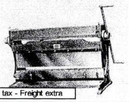

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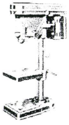

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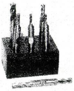

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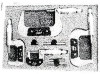

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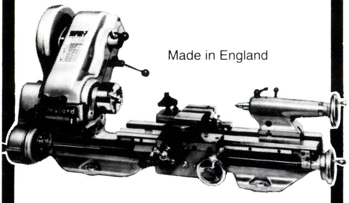

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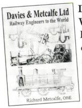

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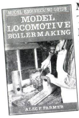

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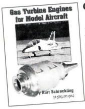

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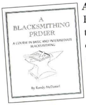

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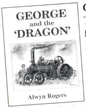

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Photo Etched Nameplates

By Bruce Allen

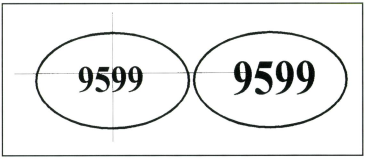
Artwork prepared by the author

Steam locomotives and their tenders used to have more plates on them than just their builder's plates. There were shed plates, tender tab plates, and information plates of all types. Most of these were cast, giving raised letters above a background which may have been painted red, black or other colours.

The fitting of well-made plates that are reasonably authentic and accurate to the prototype will raise a model from the class of being very good to excellent.

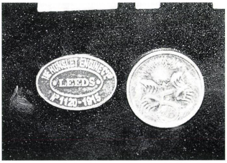
Some modellers may get away with engraved plates in certain situations but nothing beats the authentic look of the cast ones. But herein lies a problem. Unless the prototype has an excessively large plate the patternmaking could be difficult. Lost wax castings may be a possibility, but the scope for the details that a modeller using this method can achieve is an unknown field to me.

To get a great amount of detail into a plate, I believe that the best method is photo etching. With etching, the letters and other details are covered in a corrosive-resistant material. During the etching process the background is eaten away leaving the letters raised. Up until now the biggest drawback to that method has been the production of the master artwork. With the rapid expansion of the use of home computers, laser printers and cheap CAD packages, this problem has been eliminated.



Different size numbers in the same size plate

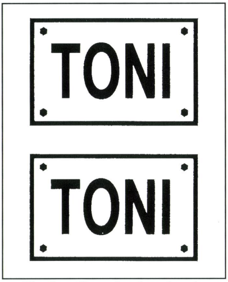
Let us start at the CAD packages. For a couple of years now I have been using an early version of AutoSketch®. The features relevant to plate making include a wide variety of fonts, or lettering styles, each of which can be varied in letter height, width, and can be made in italic or bold. The borders around the plates are very simple to do as some of the plates that I have made will illustrate.



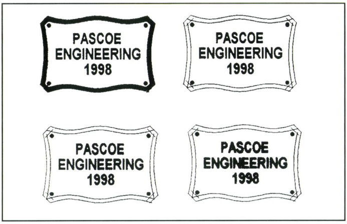
The cab-side builder's plate on NSWGR 27 class loco formerly belonging to the late Greg Young and now owned by the author. The five cent coin illustrates the small size.

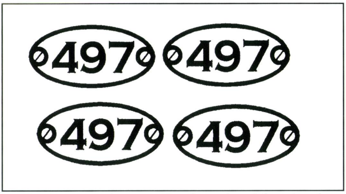
Laser printers are another common component in home computer packages today. Make sure that the clear film that you put into the printer is suitable to take the heat of the laser printer. Although I have not seen it I have heard stories of the wrong clear sheet welding itself to the rollers and other works. If you think your mechanic charges for work on your car, have a stiff drink before presenting a printer in this condition to a computer repairer for a quote.

Drawing plates is the most enjoyable part. If you are just beginning try a plain rectangular one. I usually form each word individually as any CAD program worth its salt can move individual elements of a drawing around to suit. Scroll through the font styles available to you to choose which one best fits the plate you are doing. The bold form of the letter is usually the best one to choose as fine details may be lost in the etching process. Play around with the sizes and borders. Again most CAD packages allow you to make several copies of the plate on one drawing sheet. Modify the overall sizes using a scaling function so you can get the size just right. Print out the results on plain paper to see which one best suits your application. When you are happy with the result make a block of multiple copies. It is easier to do this now and have a couple of extra plates left over than to have to repeat the whole process.



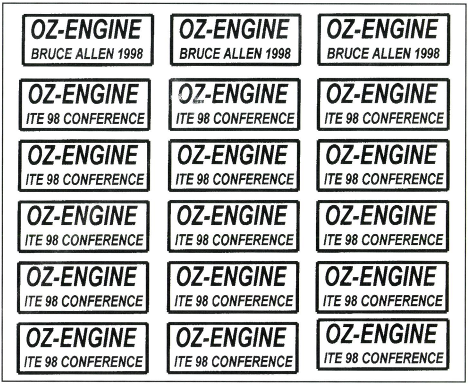
The above illustration shows how the process can be used to simulate bolts while the example below depicts rivets.





This illustrations depicts another plate style and shows how the process can be used to simulate screws

Two more plates on the author's 5" gauge NSW 27 class locomotive



Mass production can be achieved by laying out several plates on one sheet as shown here.

At this stage print "**THIS SHOULD READ BACKWARDS**" on your drawing. This is to help you get the master the right way around. Otherwise you will be like one of my lesser electronics students who ignored the note and spent a couple of futile weeks trying to get a mirror imaged printed circuit board to work. At least with name plates the error will soon be noticed and rectified.

The materials and equipment needed are:

- A light box fitted with an ultra violet light source. This may be a globe or fluorescent tube which is of the ultra violet type.
- An oven, which can be temperature controlled to 70°C.
- A thermometer to check same.
- A photographic developing tray or similar
- A beaker or large jar for use as an etching tank.
- Sheet brass for the plates.
- Kitchen scourer and Ajax®.
- Positive Photo Resist paint DSE cat. N1003
- Sodium hydroxide flakes, buttons or powder.
- Ferric chloride DSE cat. N5652
- Scraps of contact paper.

At nearly $40 the can of paint is the most expensive item but this can be shared if a few of you in a club decide to put together a batch of plates. This will spread the cost around. To give you a rough idea of the contents of a can, last year in class we photo etched forty electronic printed circuit boards measuring 70mm by 110mm. We are still using the same can. There is a use by date on the can. Due to an over order the other year we have a few cans that are out of date. We are successfully using a can with a two year old expiry date, so the stuff seems to keep OK.

The process works like this

The brass sheet is scrubbed scrupulously clean using the Ajax and the scourer. The surface is then painted with an even coat of light-sensitive paint. This needs to be done in subdued light.

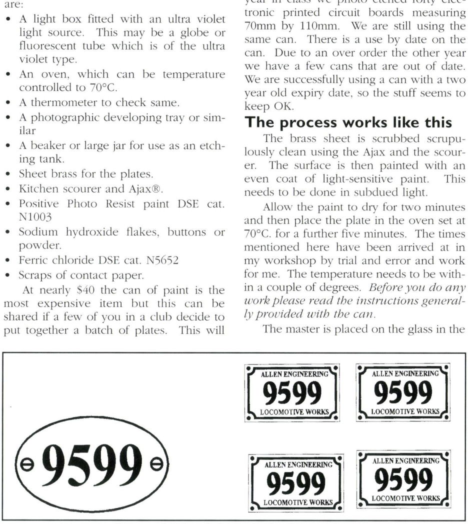
Allow the paint to dry for two minutes and then place the plate in the oven set at 70°C. for a further five minutes. The times mentioned here have been arrived at in my workshop by trial and error and work for me. The temperature needs to be within a couple of degrees. *Before you do any work please read the instructions generally provided with the can.*

The master is placed on the glass in the light box making sure that the writing is mirror image up and "**THIS SHOULD READ BACKWARDS**" reads backwards. Place the coated brass face down on the master with a weight on it to ensure total contact with the stencil. Switch on the UV light and expose the paint for seven minutes.

While this is being done mix up the developer. 16gm of sodium hydroxide is mixed into one litre of water. The solution is poured into the developing tray. When the UV light is switched off hold the brass plate by the edges in the developing solution and swirl it around. This will wash away the exposed paint, leaving the artwork printed on the brass. At the instant the print is satisfactory, rinse off the developer under running water. Set the plate aside and allow it to dry. Discard the used developer. It is best to use a fresh batch daily. Place the plate in the oven overnight to allow the printed pattern to harden.

Carefully examine the printed images of the several plates that you have made. Select the best few and cover the others with contact paper. This will stop the unwanted plates from being etched and you can clean them off and have another go with other plates later on. Also place contact paper on the reverse side of the plate to protect it during the etching process.

One of the things that I impress on my students, as a teacher of Industrial Arts, is to make sure that each part of the process is done thoroughly. The few seconds or minutes it takes extra to do the job properly the first time will be more than amply repaid by the savings of the minutes or hours later that it will take to fix the error.



Two possibilities of plate styles for the same loco

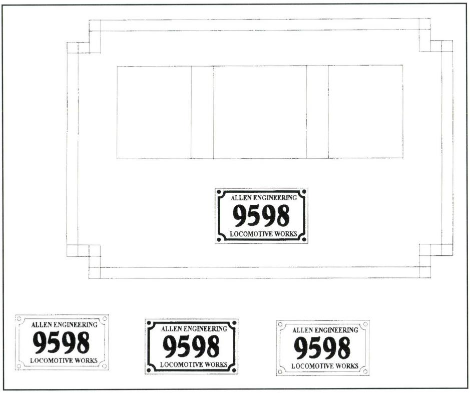
If that is the only thing they ever learn from me I will die happy.

Drill a small hole, say 3mm, in an unwanted corner of the plates and tie on some electrical wire. Empty the ferric chloride solution into a large wide jar and lower the plates in. Lightly "jiggle" the plates for a couple of minutes. Remove them and rinse them off under some running water. Careful examination of the surface will show where the etching has started. If there is a little section of paint where it shouldn't be carefully scratch it off with a scriber. If any of the plates have the pattern with too many blemishes, cover them over with a small scrap of contact paper to prevent any further etching from taking place.

Leave the plates in the ferric chloride agitating it slightly from time to time until sufficient depth of etching has taken place. If the plate has been left in too long the ferric chloride will undercut the thinner parts of the artwork.

When you have finished etching rinse the plates under running water. Cut the individual plates out to size and file them to shape. Paint the background colour using mineral based paint. Do not worry about being too neat and getting paint on the letters. It is best now to set the plates aside for a few days to allow the paint to dry thoroughly and harden.

Place some fine wet or dry abrasive paper, say 400 grit, on a smooth surface. Rub the plates carefully on the paper. The raised brass letters will soon emerge from the background. Do not be tempted to rub too hard as sometimes the letters will be quickly worn away. Spray a coat of clear protective lacquer on the brass letters to preserve the shine.



Some variations on a theme.

To attach the plates use Superglue®, I turn the surface so that it is horizontal. A few drops of the wonder adhesive and the much improved-looking model locomotive is ready to impress.

I am indebted to the late Greg Young for introducing me to the process in the first place.

FOOTNOTE*: Recent information is that the DSE Photo Resist in a can is no longer available in New Zealand. However it can be ordered from DSE in Sydney Ph. +61 2 9395 1101 or fax +61 2 9395 1155 or on the Internet at www.dse.com.au*

Rust Removal

by John Cummings

There was an article called *Safe and Simple Rust Removal* in issue No. 77 (March-April 1998), which at the time started stirring my memory bank.

Some years ago, a friend who has a private museum out west of Lithgow, talked about his method of rust removal which did not use an electrical current, but he would not tell me what it was. Recently, another friend was able to tell me what it was.

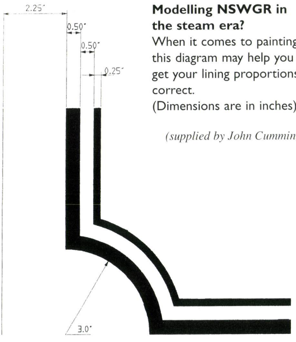
It's a mixture of molasses and water! You can make it either one part molasses to five parts water or alternatively to seven parts water. The molasses must be SLOWLY poured into the water at the same time as the water is being STIRRED so that it dissolves, otherwise the molasses forms a blob in the container. My friend said he used a large plastic drum to mix it in and that the solution lasts for six months.

Whilst I was writing this article, the Secretary of the Blue Mountains Railway Soc. walked in and read the notes. He then proceeded to tell me what he does to remove heavy rust. He takes a large plastic container, depending on the size of the article to be treated, and then buys several litres of white vinegar from the local supermarket. He pours this into the plastic container and then deposits the item to be de-rusted into it, leaving it to stand over night (or longer if need be). Once the rust is removed, it must be immediately washed in clean water and then treated to stop it from rusting again.

The vinegar can be reused by letting the sediment settle, then pour off the clear liquid and bottle it until required.

Modelling NSWGR in the steam era?
When it comes to painting, this diagram may help you to get your lining proportions correct.
(Dimensions are in inches)

(supplied by John Cummings)



PAINT OUTLINE DIMENSIONS OF N.S.W. RAILWAYS

Railex '99

Story and photos by Rod Case

After six years of fine weather, Railex 1999 continued this year's trend of wet rallies. Reasonable weather prevailed on Friday and Sunday, but Saturday, the main running day, was drenched and organiser Greg Waddle said it had "knocked attendance for a six". But in true enthusiasts style, the trains never stopped and rail and model buffs were still able to enjoy the high standard we have come to expect from the Evandale Light Rail and Steam Society. Passengers of all ages cheerfully boarded the wagons and set off, umbrellas open, for a ride around the society's newly-extended track. Also, the ELRSS was again able to make a donation to charity, Bluey Day being this year's beneficiary from what is one of the prime reasons for Railex. Bluey Day will in turn support the cancer ward of the local hospital.

A variety of engines ran on Friday and Sunday, including Jock McLachlan's AN-liveried Z class diesel, but it was steam, steam, steam on Saturday with three Heidi locos, including those of members Peter Lawson and Ray Peck, doing the hauling. Both these Heidis are scaled down from 2-foot gauge locomotives which ran in WA. Ray's has 2" bore x 3"stroke cylinders and a four wheel tender. With the help of friends, the engine took Ray two years to build and it has now been running for four. Peter spent 1600 hours on his engine, which is slightly more powerful than Ray's, featuring 2¼" bore x 3½" stroke cylinders. It weighs in at 200 kg, helped by an 8-wheel, bogie tender. Named *Tamar*, this engine completed more work than ever before at Railex 1999. And the wet wasn't stopping Peter from enjoying himself — at the end of the event he had "still had three days driving!"

A wet day at Railex — the Station area on Saturday afternoon, usually crowded in fine weather

According to Peter, the only thing that was going to stop the trains was lack of traction. That was the reason for the high speeds along the back straight — impetus was needed to get up the slope. But a few records may have been set as well!

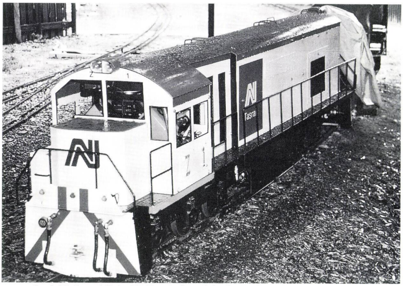
Enjoying their first Railex were rally-regulars John Steadman and his father Merv, of the Altona Miniature Railway in Victoria. John and Merv owned the third Heidi, one of their three Heidi engines, and it drew a lot of attention from fellow enthusiasts. Merv built the 0-4-2 Welsh shunter in three years, working on it "eight hours a day, seven days a week". The Steadmans, with their wives, are the first mainlanders to attend Railex, a fact not missed by local media and John's photo appeared in Saturday's Launceston *Examiner*. The rain wasn't stopping him either and he was having as much fun as anyone.

As well as the Steadmans, new for Railex 1999 was an extension of around 280 metres to the 7¼" and 5½" gauge track, giving the society a total track length of close on 700 metres. The new loop includes a cutting and a signal system and gives visitors an even better experience of model engineering.

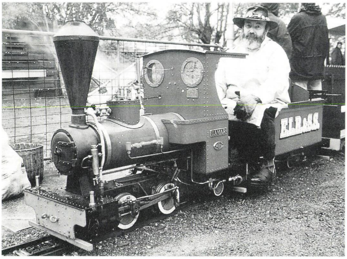
Staged partly to bring all types of model enthusiasts together, Railex again included boats, tethered aircraft and model layouts. Saturday's weather grounded the planes and, ironically, was too wet for the boats to take to the lake but a selection of them, mainly from Hobart, were still on show indoors, including Grahame Seabrook's prize-winning open steam launch, equipped with a working Windermere Kettle.

The launch is built of huon pine and is powered by a freelance version of a Stuart

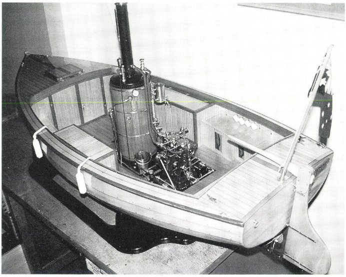
Ray Peck of ELRSS with his Heidi and passengers



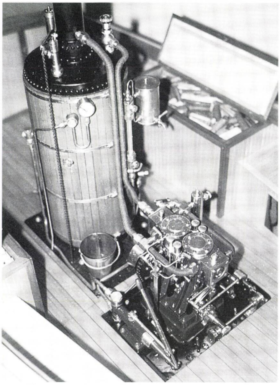
Jock McLaughlin's AN liveried model of a Z class diesel electric loco



ELRSS member Peter Lawson and his Heidi Tamar



Grahame Seabrook's superb open steam launch which took first prize at this year's Model Makers and Collectors Exhibition in Hobart



The steam plant in Grahame's open launch. The Windemere Kettle on the boiler side is a working model

Double 10 engine. All copper nails, roves and some boiler fittings are hand made and even the 'enamel' mugs for the kettle are turned brass. The construction method was the same as the original full-size boat. Attention to detail is superb and the five year build time was rewarded with first prize overall at this years Model Makers and Collectors Exhibition in Hobart.

Among the other boats was David Hunt's fishing trawler, with hand-made cray pots and an aluminium dinghy built by Tasmanian catamaran builder Incat. David was greatly amused by the irony of the pots, which had taken an hour and a quarter each to build. "The real ones only take three quarters of an hour" he laughed. The hull of the trawler is from an original builder's half-mould but the fittings are all of David's design. And the salt stains on the dinghy are real! They run their models in the ocean in Hobart.

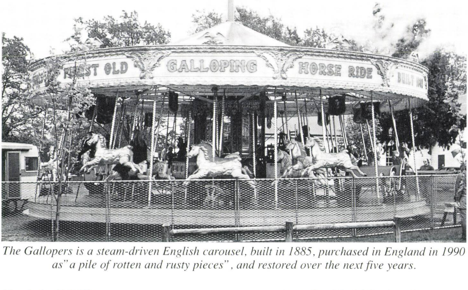
Also present were two boats by Dr. Philip Murrell, including the icebreaker *Nella Dan*, built from scale drawings supplied by the original ship's builder. Dr Murrell has now set his sights even higher and is building a 10-foot long model of the *Titanic*.

But the main action was around the trains where a small but consistent stream of passengers took rides and ELRSS members took advantage of the quieter day to check out and drive John's Heidi. Greg Waddle, whose property hosts Railex, believes the rain may even have had a positive effect by giving the enthusiasts more time to talk together. And that was probably true for the society's members as they huddled from the rain under the station awning or in the signal box. But it was also a bonus for any would-be model engineer to be able to find so much experience in one place.

Displays and trade stalls were again set up in the hall, offering respite from the continual rain and this year a machine tools stall from the mainland was a feature as the standing of Railex continues to grow. Local model builder Claude Hawthen also attended, his models unique in having been built completely from scratch, right down to hand-moulded tyres.

ELRSS members are keen to consolidate their gains for next year but the event will still feature something new. A separate 5" gauge track is under construction. Jock McLaughlin is building a ZA class locomotive. Peter Lawson has his sights set on a Garratt and the society itself has a number of long-term plans.

Attendance for this year has been estimated at 3000-4000 despite the rain, and with continued mainland interest and fine weather, Railex looks set to keep on getting better.



The Gallopers is a steam-driven English carousel, built in 1885, purchased in England in 1990 as" a pile of rotten and rusty pieces", and restored over the next five years.

Surface Plates — Let's be Practical

By Brian Smith

Graham Ockleshaw's (AME March-April 1999) 'correction' of Steve Reeve's surface plate 'recommendations' immediately had me saddling up my hobbyhorse.

When publishing our knowledge to model engineers we 'professional' engineers have a duty to recognise not only fellow experienced 'professionals' but the tyro who turns to magazines such as *AME* for guidance. I use the term 'professional' in the sense of those who have earned their living as practising engineers.

There is nothing wrong in quoting the generally excellent Australian Standards but if we do so in the context of this magazine we should be aware that many others might have little or no knowledge of them. In truth, assessing and achieving flatness of surface plates to meet even the lowest level of engineering standards in the world is a complex process demanding equipment beyond most tool rooms and certainly the typical engineering hobbyist.

I am unhappy with the picture that Graham Ockleshaw's article presented although I respect what I see as the principles behind Graham's letter. Very few have the opportunity, finance, or even knowledge to carefully plan their workshop against clearly known needs then go out and buy the planned equipment. Most simply start into the world of model engineering and gradually acquire equipment as needs arise or circumstance presents the equipment to them. Almost certainly their needs, skills or even interests will change. Thus does their workshop grow! You, the reader as a hobbyist, must choose the standard you wish to work to, or have to put up with until circumstances allow change.

Let us be practical about such things! Industry does not have to be bound by cost, available space, purchasing access to, or availability of, a suitable surface plate. Most model engineers will be. Industry can and should follow 'best practice'. I definitely agree with anyone who says it is best not to start off with errors and in principle we would be wise to endeavour to do likewise and therefore have a 'you beaut' surface plate certified to metrology standards. But, as I stated, Let us be practical about such things. Surely half the fun in making our creations is in the innovation we employ to overcome the limitations of our workshop equipment.

The real point I wish to make is that for the model engineer the choice of tools is often a matter of 'horses for courses' and personal preference. Industry is in business to make money and to do so must usually adhere to standards. Industry cannot afford the time to 'make do' whereas that is often part of the challenge and fun for we model engineers.

Experienced practitioners get to know what they can 'get away with' for the application in hand. The tyro has little hope but to fly blind, rely on someone who knows, (if they have access to such a person) or read model engineering magazines. My 'hobby horse' is imparting knowledge in a way to help such people.

So, where does this get the tyros who probably have little idea where they are heading with their model engineering and therefore what surface plate to get?

I believe that to give these people the best guidance available, would mean every reader of this magazine describing what they use for a surface plate, where they got it, what criteria they applied to select it, what its flatness is, how they have determined that, plus added comment on what they have achieved in their creations using that plate. A mammoth, and I think, impractical exercise. I am sure very few would know what deviation from flatness their surface plate has anyway!

I do not have all the answers here, but hopefully what follows will assist a little.

Surface plates are intended and used for either or both of two purposes:

1. As a precision surface providing a datum for marking out.

Probably the majority of your use will be for 'marking out'. I'll wager that whatever your surface plate is made of it will hold better accuracy than you can when scribing a line with your height gauge. What is your accuracy of determination when setting your height gauge anyway? Or are you using a surface gauge (scribing block/stand). Certainly any deviation of flatness of your surface plate will add to the above variations, but what are you scribing a line for? To drill holes? To machine to? Chances are you will be using your marking out as a 'road map' so that you know where you are drilling the holes or as a guide for machining. You will most likely be using it in conjunction with measuring your work piece to achieve dimension anyway. Don't forget that your scribed line has width and you will be judging which part of it represents your desired measurement!

2. As a common datum for measuring or comparing.

Measuring, comparing or setting up operations on your surface plate still requires you to consider your true needs and the ability of you and your measuring equipment to meet those needs.

Let me ask, "What do you intend using the 'surface plate' for?" Now think about that in terms of the precision required by what you expect to make.

If you are marking out free-hand on a wooden bench or laminate surface and your projects work but you want a 'surface plate,' then go out and get a piece of float glass or 'pink marble,' or even a piece of surface ground mild steel plate if that is all that is available to you at the moment. Available as in 'there' and you can afford it. It will be better than what you have. 460mm of overhanging float glass may well deflect. So, don't overhang it! International model engineering magazines have repeatedly proposed the use of float glass and recommended either of two methods of supporting it. The simplest is to place it on a piece of hard white felt about 1cm thick ($^1/_2$") to support it evenly. The other is to part fill a shallow wooden tray with plaster of Paris. When set, a thin slurry of the same plaster is spread over the surface, the float glass being lightly pressed onto the new surface. When dry the plaster supports the glass.

I would like to know how much and under what weight Graham Ockleshaw's float glass deflected to problem proportions? I have in mind a beautiful precision machine tool, excellently finished, the slide ways of which could not be better etc. The maker uses a piece of float glass on his wooden bench as a surface plate!

Should a piece of pink marble be your lot, don't despair. By the time it is worn enough to be a problem you will most likely have found or want something else. At least if you know it may wear fast you will be alert to that. Granite of course is better whatever its colour but, as Graham has said in other words, you can't expect material prepared for tombstones, buildings or fire surrounds to meet Australian surface plate standards for flatness.

If your luck is in and you have found a second hand cast iron surface plate don't expect it to be a solid slab of cast iron (especially 4" thick). Cast iron surface plates are of 'ribbed' section for several reasons.

Most importantly a ribbed section imparts more stability and rigidity than an equivalently dimensioned solid section would. A solid slab of cast iron will present casting problems. Some may be exposed during machining; some may lurk undetected within the body of cast iron causing distortion as the material ages, or as it repeatedly heats and cools with daily weather fluctuations. Weight saving by using the ribbed section is a minor consideration — unless moving the surface plate!

Let us consider the unlikely but fortunate possibility of you having a choice out of the materials mentioned above. Which should you chose? Ignoring size and cost because they are your 'factors' and therefore unknown to me, the question becomes a matter of suitability, wearability and flatness.

If my circumstances dictated what would I choose from the above, why and in what order?

1. I would seek a **cast iron** or granite surface plate, preferably cast iron. I believe a wider range of sizes is in use than in granite so I am more likely to find what I want. Any second hand surface plates are likely to have suffered abuse. I know I can resurface a cast iron plate myself if necessary (although not without some logistical difficulties) whereas I would have to locate a specialist granite surface plate manufacturer willing to resurface my plate. I couldn't afford to have the work done! I would hope to find a cast iron plate that has been heat treated (for stability). Cast iron does not burr as readily as steel when accidentally hit but it can be scratched and may chip along an edge. Sliding work pieces over its surface is unlikely to score it. Lightly oiling the surface after use prevents rusting. You may find that choice of size is limited by what you can find at the time you are seeking one. I can only imagine that costs of used surface plates would vary immensely. I have seen a 600 x 600 plate around $1500, yet as I write this, I am aware of one the same size being advertised at $80 and another 720 x 600 for $250.

2. **Granite** is hard, wear resistant and can be finished to a very smooth surface with a silk like texture providing a similar 'sliding' surface to cast iron. The surface won't rust but can be scratched, scored, chipped or may crack more readily than cast iron depending upon what grade it is. Being rarer than cast iron, granite surface plates are less likely to be found on the second hand market. Chances are that you will be looking at a piece of granite rather than a manufactured surface plate. Should you be considering a 'slab' of granite I would think that you would be looking at an existing 'offcut'. Explain your needs to the stonemason who should be able to select the best piece available in terms of grade, thickness and flatness. I would use a piece not less than 19mm (3/4") thick for a 300mm x 300mm plate, 25mm (1") thick or more for double that size. Being, to the stonemason, a novelty application he may well offer to trim the sides square and chamfer the edges for you. Cost is likely to vary considerably.

3. **Float glass** is hard, wear resistant and probably the least likely to be scratched, chipped or broken if one is careless and again it will not rust. (If necessary I would select an offcut of granite in preference to the float glass if I could readily find a suitably flat piece.) Usually only one side of the glass will be flat so be careful when using it or embedding it in plaster of Paris! Size and availability will be dependent upon the glass suppliers convenient to you but I think thickness is usually in the order of 1cm. A piece approximately 300mm x 300mm would probably cost around $20 to $30.

4. **Pink marble** would be the least favourable in terms of wear resistance, scoring and likely flatness available. You will probably be dealing with a stonemason so explain your needs as for granite.

5. **Ground steel plate**. Normally the last of my choices although I know I could rework the steel plate to a greater degree of flatness than surface grinding would give. Probably a piece of boilerplate, oxy cut to size then surface ground on one if not both faces and preferably all edges machined. The thought of using this may give some the horrors but this is all about you needing a better surface to work from than what you have now! Size will be restricted to what you can get ground. The plate supplier may be able to recommend someone to you. A burr can be easily raised on steel if it is hit. A fine burr will be raised even when the tiniest steel cutting or piece of grit scores the surface. A piece 12 to 15mm would suffice up to about 300mm x 300mm or 19 to 25mm thick (3/4" to 1") above that size. I would find it difficult to choose between steel plate and marble never having used marble. I have used a steel temporary 'surface plate' in the field but just did not like the 'toothy feel' beneath the height gauge! If I could find a suitably flat piece of marble then I would choose that over steel.

So, you have found the 'plate' you want or are willing to suffer, but how do you determine if it is flat enough for you? First you need some idea of what deviation from absolute flatness you can tolerate. I am mindful that in engineering terms you may have little idea of how flat is 'flat'! Don't reach for your dictionary it won't help you.

So, let us assume that what you have found is about 500 x 500 and in poor condition, worn to say about 0.1mm (or 0.004") concave, although I rather doubt if you will find a cast iron surface plate that bad. Let us also assume that the wear is of concave form nicely displaced evenly about the centre of the plate and graduating to the edges of it.

Let us take a simple example to see the effect of the above deviation — marking out for drilling several holes and milling a step — let's assume 3 scribed lines in each of the horizontal and vertical planes on a plain machined surface (See diagram).

Without going any further the absolute maximum error the surface plate can give you is 0.1mm from one end of a scribed line to the middle.

You have scribed 3 lines in one plane to a datum edge so now turn the work piece vertically through 90° to complete your marking out. You will experience the previous maximum possible error plus an error of squareness of the two sets of lines to each other where they intersect.

The following diagram illustrates the foregoing, albeit rather exaggerated. Assume the intersections of horizontal and vertical lines marked by angles **a** through to **f** are where you will be drilling holes and you will be milling a step, the surface of which is marked by points **g**, **h** and **j**, then as you view the diagram:

For drilling location:

1. Hole **d** will be out of line vertically with holes **a** and **g** by less than 0.1mm (or 0.004").

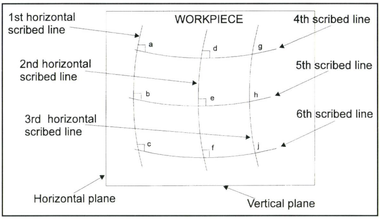
2. Holes **e** and **f** will also be correspondingly out of line with **b** and **c** respectively.

3. You will have a similar result in the other plane.

4. All holes will be the correct distance from any other hole sharing a common centreline.

5. All holes will be an incorrect distance from their diagonal 'neighbours'.

6. Hole **e** will be the worst case being some part of 0.1mm (or 0.004") out of position in both horizontal and vertical planes.



To put the above into perspective, assuming there was no error do you believe you could centre punch and drill each hole in its correct position within 0.1mm (or 0.004")?

So, in this drilling example your worn surface plate is not going to get you into any trouble greater than an additional 0.1mm (or 0.004") error against one to Australian Standards.

For milling

Let us now assume that you will be milling a step along the line **ghj** from the top of the work piece. One would normally set up to the same datum used for marking out — in this case the edge of the work piece shown as the horizontal plane in the diagram.

If you were simply milling to 'split' the line **ghj** then points **g** and **j** will be true to the datum within your accuracy of determination, i.e. your ability to split the line.

Assuming you were milling along the line **ghj** to measurement from the datum face then points **g** and **j** will be true to the datum within your accuracy of measurement. For this example I am assuming measurement is by micrometer or Vernier calipers of some form.

In both cases point **h** becomes irrelevant but holes **b** and **e** will be nominally part of 0.1mm (or 0.004") further away from the milled surface than intended (plus or minus your milling 'error').

In this milling example the 'Australian Standards' surface plate will do no better than your worn surface plate.

Measuring from surface plate

This is where your worn surface plate could get you into trouble. Trying to explain this one is like the proverbial can of worms. All I can do is alert you to where the potential problems lie.

(a) Using your Vernier height gauge to measure the milled face. If you are smart you will very carefully have the base of your height gauge bridge the area where the end of the datum face of the work piece contacts the surface plate and then measure each end of the milled face. Sure there will be a very small error because your height gauge will be 'leaning over' at a slight angle. (Anyone care to calculate that angle and the resultant error if measuring height is about 150mm?) If you are even smarter you will stand your height gauge on a parallel strip, or strips, of the same length as your work piece. (If you have strips of such length!) There will probably still be some small error as your strips will not have the same 'footprint' as your work piece nor be sitting in the same location.

(b) Using a dial indicator to compare your milled surface 'height' with a reference piece of known dimension. (Slip gauges for example). For best accuracy in this case your reference piece needs to have the same footprint and stand in the same location as the work piece as does whatever is supporting your dial indicator. An improbable situation!

A nice surface plate to Australian Standards would make life a lot easier! However, let us remember that this is about not having one.

One answer is to 'map' your 'surface plate' so that you know what errors the surface has. Don't run away in fright. We will adhere to the KISS principle — with you and your available equipment determining the level of precision the results can show.

Here is about the simplest method I can think of which would enable you to gain some idea of a surface plate's flatness and could serve as a first point of reference before getting involved in more complex procedures.

You will need a round straight bar to bridge diagonally opposite corners of the plate under test. Forget about how straight the bar is at this stage, I am trying to get the concept across to you. You will also need some cigarette papers — yes they are still available!

1. Lay one cigarette paper at the plate's centre — surface of course! Place your bar across the paper so that it rests on two diagonally opposite corners of the plate. Try to lightly pull the paper clear from the bar. If the bar moves your plate's deviation from flat, at the centre, is better than the thickness of the paper which is said to be 0.001" (or 0.025mm). If the paper pulls free easily you may immediately decide that it is not good enough for you.

2. If the bar moved repeat the procedure but hold the bar lightly, without pressing, to prevent it moving. Mentally note the resistance to removing the paper. Note: a magnet at each end of the bar as a stop would be a good consistent restraint.

3. Repeat 2 with the bar across the other two corners. You can now assess three possibilities, albeit subjectively. If the paper pulled free without a trace of resistance the plate is warped to a degree beyond the thickness of the paper. If there was considerably greater resistance the plate is warped to a degree less than the thickness of the paper. If resistance was about the same no warping is indicated (but small warpage may still exist).

4. If in 2 or 3 the paper tore you may consider the gap between bar and plate to be about or less than half paper thickness.

5. You can repeat the above anywhere along the bar and anywhere across the plate from side to side or along each side and at least get some idea of the plate's condition.

6. If by now you haven't discarded the plate you can do a simple light test. With a light behind the surface plate try to look along the surface of the plate to see any light gap between the bar and plate. The bluer the light the smaller the gap. As the gap increases the light tends towards yellow. The circumferential surface of the bar against the large surface of the plate is a bit misleading but as a guide blue light will be less than 0.001mm (0.0004"), yellow light about 0.025mm (0.001"). Natural light is best.

All of this can only be as good as the bar you use. I would consider nothing less than 25mm (1") diameter up to plate size 400 x 400, 38mm ($1\frac{1}{2}$") up to 600 x 600. Preferably cylindrically ground for straightness, parallelism doesn't matter although any barrelling is out. If drawn bar stock is your lot you may find that to be surprisingly straight. You can easily check this where (if) the bar lightly grips the paper. Rotate the bar 90° and try the paper. Repeat twice more. Any deviation in straightness of the bar will be detected in the 'feel' of the paper.

Where to from here?

If the paper pulled freely in 1 above but you really liked the plate (or its price!) add another paper or two to increase the thickness. Remember this is all about what satisfies you!

If you want a more precise evaluation then it's off to your nearest friendly toolmaker or metrologist!

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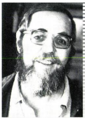
Steam Chest



with Dave Harper

Hi there, steam fans, and welcome to the first column written in the new year, century or millennium, as you wish! I've had loads of feedback about previous columns, which is great, and I'm still getting more old papers etc. sent to me, which is even better!

Victorian steam power update

The steeple compound engine mentioned in the Nov/Dec 99 issue generated a lot of interest. One of my callers finally put me in contact with the son of the original owner, Lou Osborne.

Son, John Osborne, kindly sent me the following information via email:

"My father, Lou Osborne, installed the system at his house at Faraday, near Harcourt. He installed the Reader engine first, some twenty years ago. He subsequently converted a V-twin air compressor to a twin compound steam engine driving an 800w generator. This smaller engine was used most of the time for power, with the exhaust steam providing hot water and heating, with the Reader engine only being used if there were larger loads on the system as well as hot water and heating needs. Due to problems with water leaking into the crankcase in the small engine, he then decided that the converted air compressor was not satisfactory and so designed, made and installed the current steeple compound engine. He prepared the detail design drawings, made all the patterns and machined all the components on the lathe that he made as an apprentice in the 1920s. I still have the lathe.

Some time after this, as his timber supplies began to dwindle, he installed a solar hot water system to provide hot water, and a wind turbine to provide power. He was in his early 80s when he installed the wind generator.

Further details of the system that you may find of interest can be found on the Alternative Technology Association web page located at:

www.ata.org.au/~ata/45steam.htm "

I must confess that I haven't followed up on whether the steam plant was sold, nor have I checked the web site given. I'd appreciate any feedback on either sub-

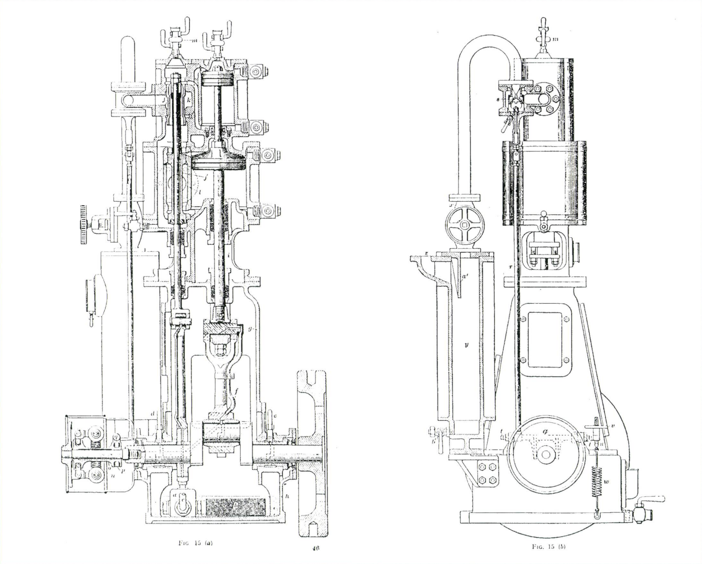


FIG. 15 (a)

FIG. 15 (b)

Figure 1

ject...meantime, I'm sure we all appreciate John Osborne's insight into his father's activities. John, you have our thanks, and condolences on the loss of your father, obviously a very talented man.

So, what is in a name?

As a final comment on the argument I raised about the term steeple compound, and whether it should be called a vertical tandem compound, I am informed by no less an authority than Dave Sampson that the former term is more commonly used in America, and the latter in the UK! One catalogue that Dave showed me listed one engine as 'a vertical, tandem compound, steeple engine', thus covering all bases! The design was apparently popular for small marine engines where space was at a premium.

Don Clark, of Barwon Heads in Victoria, sent me a package containing copies of several articles on steeple compound engines that have appeared at various times in the model press, also copies from old catalogues etc. The drawing I'm reproducing here, (**figure 1**), Don reckons is a Bellis & Morcom design, similar to one in the Power House Museum in Sydney. Certainly the governor is typical B & M, so I wouldn't argue, Don!

It clearly shows the layout for anyone unfamiliar with the type, and also illustrates a comment by Don that using a common valve pushrod for both cylinders leaves the HP cylinder with long steam passages between the steam chest and cylinder, one failing of the design.

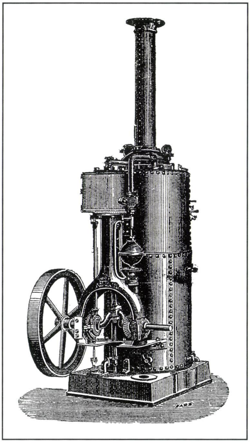


Figure 2

Yet more Victorian steam power

The engraving of the generating set powered by a diagonal steam engine, (figure 2, p37 in the Nov/Dec 99 issue) also called forth comment from Don Clark. Don kindly sent me some pages photocopied from an old book titled *Dynamo Electric Machines* published in 1892. They give details and pictures of similar generators. Don also commented: it appears to be a fairly small unit, possibly designed for lighting a large country house or similar building. An engine speed of 400/500 rpm would give a generator speed of 1200/1500 rpm which would be about right for a small Manchester type generator. Don estimates that this machine dates from about 1885. Unfortunately, space doesn't permit me to reproduce the pages Don sent me, but I'd be happy to forward copies to anyone interested.

Goldfields water supply

In his long and interesting letter Don also passed on information about the designer of the WA water supply system, C Y O'Connor. Apparently a book is available entitled *Building a State*, by J S H Le Page, and published by the Water Authority of WA. A large portion of the book apparently covers the work of this talented engineer whom Don suggests could be called the Brunel of WA.

I'm trying to obtain a copy through my local library. I'll keep you posted!

Don also noted that the duplex steam hammer shown in figure 1, p 35 of the Nov/Dec issue was designed by Mr Ramsbottom, chief engineer of the Crewe works of the GWR. Apparently this machine was used for many years in the works, so it must have been reasonably successful. As Don reminded me, Ramsbottom is probably best known for the safety valve he designed for locos.

Thank you, Don, your comments are much appreciated!

Paris Exhibition Catalogue of 1878

As mentioned in last issue, I received a package of mouldering pages torn from this catalogue by persons unknown, sent to me by Gordon Dickson. I have now had the chance to photocopy these valuable relics, and sort them into some semblance of order. The fifty double sided pages gave me 100 A4 sheets when copied, rather too many for a regular mailing. However, they have sorted into three, roughly equal sets as follows: Stationary engines and semi-portables, 36 sheets, locos, traction engines and portables 37 sheets, machine tools and boilers 25 sheets. Two sheets had no relevant information and were not included, for those keen on mental arithmetic! The first set also includes some hot-air engines, cranes and a hydro-carbon engine!

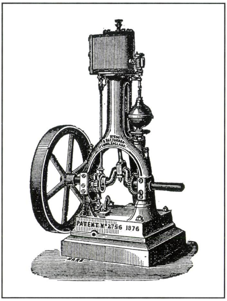


Figure 3

I've chosen a little single cylinder engine to represent this set, **figures 2 and 3**, mainly because the name tickled me! It's called the Gippeswicke engine, and was made by E R & F Turner of Ipswich, Suffolk. It is intended for driving pumping, sawing or printing machinery. The description is quoted from *Engineering*, dated 1/12/1876: It will be seen that the cylinder of the engine is fixed on the top of a neat casting constituting the frame, this casting having the cross-head guides and the crankshaft plummer blocks formed in one piece with it.

The engine was available in sizes from 2 to 8hp, prices going from 65 pounds to 165 pounds complete with boiler!

I'll be happy to send on any one of these sets of copies for my usual fee of a $4.50 book of stamps. The whole set would be worth $10, I guess.

Yet more good stuff!

I received another package around Christmas time, this one from Allan Wilson, of Tugun, Qld. Allan kindly sent me some sheets of drawings which formed part of the instructional material on an engineering drawing course. They are dimensioned drawings of various engines and machines, obviously meant as examples for the students to copy from. Some of them are even tinted, and are works of art in their own right! When I've had a chance to make copies of them, and study them more closely, I'll report further.

Yet another bundle of stuff arrived as a result of an email all the way from the USA. The first email I received simply asked for information on old steam engines, as the sender was a sculptor producing model engines as works of art...after I invited him to come and look at my library, William Dubin admitted that could be difficult as he lives in La Mesa, California!

William and I have since been chatting by email on almost a daily basis, and the result is a package of photos and computer drawings that certainly give a different slant to model engineering! I've passed the whole lot on to David Proctor, so he can decide if, and how much, to publish (as William is now a subscriber to AME, how could he refuse?)

I certainly think that William's work deserves wider publication, even if only to stir up the traditionalists! I've been able to point William in the direction of lots of ideas for his sculptures, so look forward to some interesting designs!

Condensed steam?

I've had an interest in hydraulic machines for some time now, and over the holidays I've been browsing my library for more information. By hydraulics, I don't mean the modern, oil-filled devices, but the water pressure powered machines that were fairly widespread about a hundred years ago.

The only book I've found that really mentions the subject is one of the excellent Shire Albums, No 144 *Hydraulic Machines*. This informative little book certainly covers the history of these machines and the multitude of uses they were put to. Originally used to power metal presses by Bramah around 1812 and Murray in 1826, water pressure engines were also used by Richard Trevithick for pumping water out of mines about 1803.

However, it wasn't until William (later Lord) Armstrong used water power to operate cranes and hoists around the dockside areas of Newcastle, Liverpool and London in the 1850s that the idea really took hold. Many hundreds of miles of high pressure water pipes were laid around the dock area allowing silent power to be applied to many functions that today would of course be electrically powered.

Water power was also widely used to operate swing and lifting bridges, including Tower Bridge in London. So, there are many potential modelling projects here that could be powered simply by connecting them to the nearest tap!

Who's got de book?

Among my files are copies of several chapters of an old book titled *Modern Steam Practice*. Right at the end of the section I have, it starts to talk about hydraulic machinery around Liverpool Docks, but all I have is the first page! Most frustrating, particularly as I have no idea where I borrowed the book from to make the copies! Does anyone out there have a copy of *Modern Steam Practice*? If so, please can you send me a copy of the chapter on hydraulics!

I did think of starting a column on hydraulics, but the name proved tricky. *Water Closet* just didn't seem to have the right ring.

To illustrate the potential for interesting models, **figure 4** shows a neat 3-cylinder oscillating water pressure engine. If feeding the water in through the trunnion bearings was too hard, a flexible tube to the top of the cylinder would probably do the job. As most hydraulic installations originally used steam pumps to develop the water pressure, a hydraulic pump could be operated from any model steam engine. The water pressure could then be utilised to operate further models. I'll develop this idea further in a dedicated article once I've got my material sorted out.

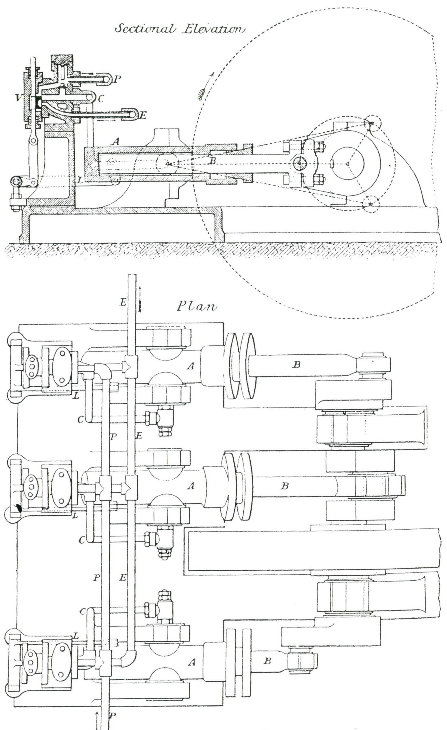


Fig. 210.—Water-pressure Engine.

A A, Cylinders. B B, Plungers. C, Pipe to cylinder. E, Exhaust pipe. L, Lever for working slide valve. P, Pressure pipe. V, Slide valve.

Figure 4

If anyone out there has any material on the subject of hydraulics, I'd love to hear from you, either by phone, email or via the editor. As always, any material I glean will be made available to interested readers.

Red Fred update

As photos seem a bit thin on the ground for this issue, I thought I'd include a couple showing my 5" g model of the QR railmotor *Red Fred* in his now finished state. All that remains is to build the 4-wheel box wagon to push him along. The

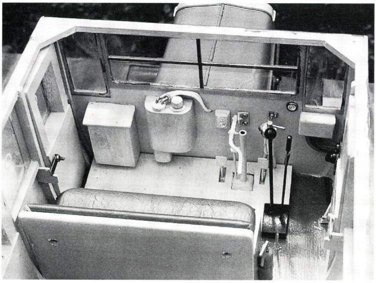


Photo 2

wagon will contain the battery, motor and radio control for speed and direction etc. He's already had a run on the tracks at Bribie Melsa, which club I have now joined in order to have somewhere to run! Pushed gently around by one of the member's steam loco, Fred ran smoothly over the points, so my wheel-turning can't be too bad!

Photos 1 to 3 give a fair idea of how Red Fred has turned out. The main problem I have at the moment is finding a suitable headlamp; it is like the old car type streamlined headlamps, just over 1" dia and about $1\frac{1}{4}$" long. I'd like to operate it on 12v, but the new high intensity LEDs may be better, generating less heat. Anyone got any ideas?

That seems plenty for this time, all the best to all our readers for year 2000, happy steaming!

Just a reminder — Dave can be reached by email at: sandave@bytesite.com.au or you can wirte to him at the AME office.

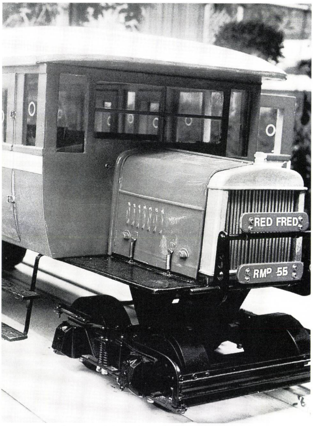
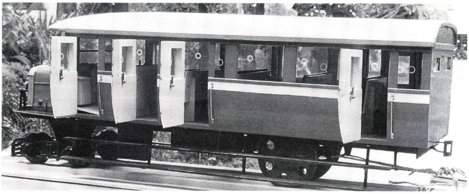


Photo 1 (above) and **Photo 3** (below)



A Lathe Chuck Cleaning 'Tool'

By Brian Smith

I do not believe in using the usual workshop high pressure compressed air supply for cleaning swarf from machines for many reasons. (I do not have such a compressor anyway).

However there are times when I feel it could make life a lot easier. One situation which used to niggle me was when changing my 4-jaw chuck jaws. The jaw itself was easy to clean with a tooth brush once removed but, cleaning the screw thread and behind the screw was a different matter. During a boat building phase of my hobby history I used a bicycle pump to clean wood dust out of frame check outs before gluing in mating parts. In those days I screwed the old type valve, rubber removed and the valve broken off at the small outlet hole, directly into the pump. One 'sharp pump' and the dust was gone, at least from the area of immediate interest.

When I acquired my present lathe and started to clean things up I used the same tool. Fine bits of swarf from behind the chuck screws were quite readily removed as well as any reasonably loose gunk. However I found the jet was a bit fine as the 'sharp pump' could propel said swarf and gunk out at a great rate usually to an inconvenient location — sometimes that was my face!

An inquisitive grandson solved the problem. Finding granddad's pump useless for inflating his bicycle tyres he tossed the broken valve to who knows where, replacing it with 'a proper connection'. Said connection succumbed to his inquisitiveness, becoming rapidly dismantled. Among the bits was the nipple which screws into the pump. I found it to be an ideal replacement for the discarded broken valve. The outlet hole accepts a $\frac{3}{32}$" dia. drill bit and being bigger than that of the valve reduces the air velocity so that my 'sharp pump' is just right. The swarf blows just clear of the chuck falling onto a piece of cardboard I place across my slideways. I also use this 'tool' selectively on other areas of the chuck including the mounting screw thread.

Do you have any useful little tips? Why not share them with other readers, no matter how simple? We would love to hear them.

Twist Drill Grinding

By Bob Ellis

Drawings for publication by Jim Gray

On reading the excellent article on twist drills by Stewart Daniels in AME issue 70, I felt disposed to offer a few of my own thoughts on the subject — but leaning towards the more 'rough and ready' solutions to the problem, such as many of us are forced to follow.

The repeated grinding of drills by hand often results in us 'losing the plot' when it comes to maintaining correct drill angles/lip lengths. The following notes describe what is possibly the commonest fault to be found in free hand ground drills, and an easily made device which will rectify the problem.

A drill ground as in Figure 2 might produce a 10% oversize hole (if the drill didn't break first). This would be disastrous if we thought we were drilling a "tapping size" hole! The device (see next page) is, in effect, a suitable piece of angle iron, bolted to the bench in correct position relative to the bench grinder.

The angle of the device to the grinding wheel pace must = 60° (use a 60° set square); the operating procedure is:-

1. Remove the end cover from the grinding wheel, place the drill in the device with the adjustment slacked off and the GRINDER SWITCHED OFF.
2. Switch the grinder ON, and slowly advance the drill until nearly in contact with the grinding wheel, by turning the adjustment wheel.
3. Rotate the drill, with the finger and thumb, in the cut out space in the angle iron, while at the same time holding the drill down and back against the adjustment. Feed the drill into the wheel with the other hand, by turning the adjustment wheel.
4. Continue this process until both cutting edges have been 'cleaned up' at the same setting. It is not necessary to remove more material than this.
5. Switch OFF the grinder, let the wheel stop and then remove the drill. Never release your grip on the drill while the wheel is turning.

You could, of course, mount the drill in the lathe chuck, and use a tool post grinder to achieve the same result. But, I for one, wouldn't expose my lathe bed to grinding wheel dust, no matter how well it was covered up!

We now have a drill with the correct point angle and equal cutting edge lengths, and it remains to ' back it off' by hand. The best way to get the 'hang' of 'backing' a drill off is to study a drill which is in good condition (the larger the better) and decide what has to be done to produce a similar effect.

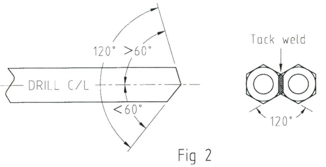


Fig 2

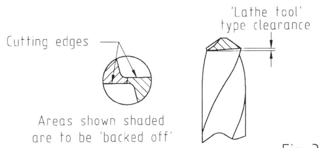

Cutting edges
'Lathe tool' type clearance
Areas shown shaded are to be 'backed off'

Fig 3

If the chisel edge point has been lost during grinding, it will automatically be restored by the 'backing off' process. Backing off must continue right up to the cutting edges (and no further) or the drill won't cut. 'Backing off" is carried out on a drill for the same reason that front clearance is provided on a lathe turning tool.

The shaded areas on Figure 3 are the areas which have to be ground back. The further the grinding proceeds back from the cutting edge, the more material must be removed, but don't overheat the drill.

1. Start with the drill in 'First Position' (Fig.1) with left hand holding near tip, right hand holding end of shank between finger and thumb. Cutting ease, against wheel, horizontal.

2. Lower shank end and raise tip end gradually to '2nd Position" at the same time rotating drill clockwise about 20° keeping a steady pressure on the grinding wheel. Repeat this several times until satisfied with result. Then carry out this procedure on the other cutting edge. You will need to remove the tool rest from the grinder for the above.

3. A well ground drill will produce uniform swarf from both flutes.

Two (say 1/2") nuts tack welded together will give 120°. For checking the drill point angle (120° may not be the theoretically correct angle but it will always work).

The above is a gross exaggeration of possibly the commonest problem resulting from the hand grinding of drills. The drill point angle is correct at 120° but the angles either side of the C/L are not equal at 60° It is, of course, essential that the angles either side of the C/L be equal. The device will rectify this situation.

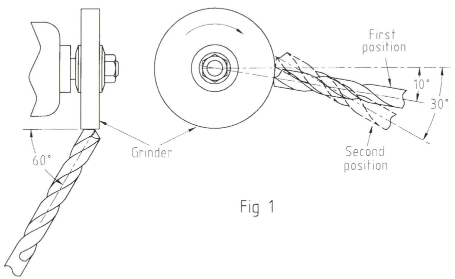
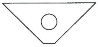
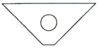


Fig 1



ITEM ①

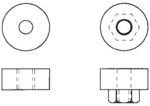
1 off 5mm thick triangle plate to run along inside of angle iron. Weld 6mm rod into into 6mm hole and clean up flush



ITEM ④

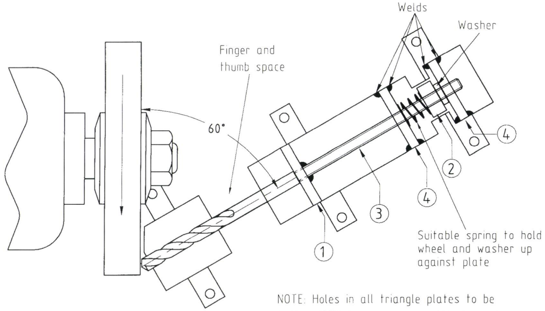
2 off triangle plates 5mm thick, 6mm clearance holes.

ITEM ③ 6mm screwed rod, 100mm long.



ITEM ② THUMB WHEEL

18 dia x 8mm thick, tapped 6mm to suit ITEM 3. If 6mm tap not available, centre of wheel may be drilled 6mm clearance and 6mm nut welded over hole.



NOTE: Holes in all triangle plates to be in line. ITEM 1 must run smoothly in angle.

Fig 4

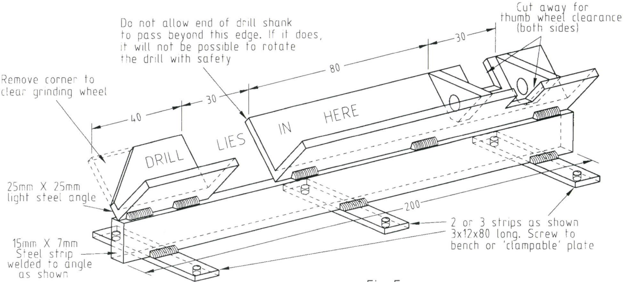

Do not allow end of drill shank to pass beyond this edge. If it does, it will not be possible to rotate the drill with safety
Cut away for thumb wheel clearance (both sides)
Remove corner to clear grinding wheel
40
30
80
30
DRILL
LIES
IN
HERE
25mm X 25mm light steel angle
200
2 or 3 strips as shown 3x12x80 long. Screw to bench or 'clampable' plate
15mm X 7mm Steel strip welded to angle as shown

Fig 5

Aligning the Chimney with the Blast Pipe

by Ted O'Brien

Drawings for publication by Zenon Zalewski

Some aspects of steam locomotive building are rather agricultural or how yer goin' but some are very accurate indeed, such as valve gear parts, rod centres and pin and bush fits etc. One often overlooked alignment is the chimney to blast pipe fixing. It is absolutely vital that they are in accurate alignment because, for maximum efficiency the steam blast must strike the inside of the chimney at the top half to third of its length.

It is especially important in prototype express type locomotives where the chimney is relatively short, i.e. the distance from the top to the choke. The smallest diameter of the petticoat pipe may be only two times the choke diameter, whereas in other locomotives, this dimension is three times or more if possible, of the choke diameter. In full size, locomotives with short chimneys always had multiple hole blast nozzle or some form of increased diameter cap. In miniature sizes these types of blast pipe cap work quite well and are very efficient — they produce a softer blast than a single hole cap. If you would rather have a blast that can be heard then the cap diameter will need to be smaller in diameter than that found by trial and error. A sharper blast will allow the locomotive to run at slower speeds than is usual on club tracks, where everyone is running at a scale of 200 mph. I think it is fair to say that most of these locomotives will not run at low speeds without the assistance of the blower. The smaller cap nozzle which draws the fire adequately at low speeds will be absolutely super at higher speeds.

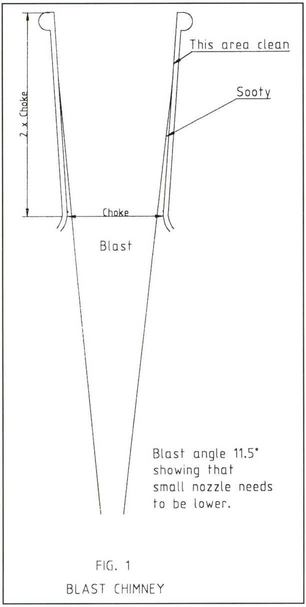

This area clean
Sooty
2 x Choke
Choke
Blast
Blast angle 11.5° showing that small nozzle needs to be lower.

FIG. 1
BLAST CHIMNEY

We could reflect on locomotive types for proof of this phenomena. A narrow gauge locomotive that usually runs at slow speed invariably has a long chimney and loud bark, whereas a high speed locomotive has a softer blast and will not steam well at slow speeds. The smaller blast pipe cap will need to be set lower in the smokebox for the blast to strike the top half to third of the chimney top.

This effect can be observed after the locomotive has had time to build up a carbon deposit inside the chimney. If the blast is coned to the top half to third of the chimney, the top will be clean and with long fine vertical marks which have been made by sparks 'cleaning' the carbon deposit off the chimney walls.This will also show whether the blast pipe is correctly aligned by the pattern of 'cleaned' soot. The simplest and best method of aligning the chimney and blast pipe is to turn a piece of about 1" diameter bright steel bar to fit neatly down the blast pipe after removing the cap or nozzle. Then make two washers that are a neat reamed or bored fit on the shaft, one washer to have an O.D. of the inside of the chimney top and the other to fit neatly inside the choke. It is a fairly simple matter to align either the blast pipe with the chimney or the chimney with the blast pipe.

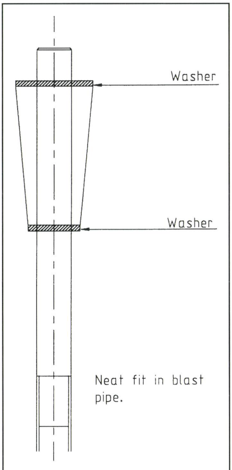


FIG. 2
ALIGNMENT TOOL

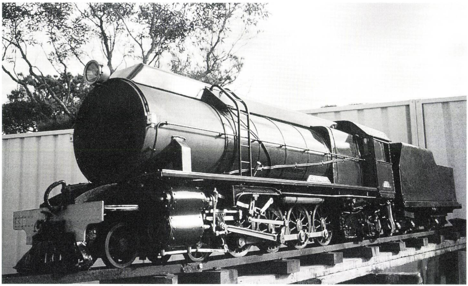
In full size practice sometimes the attachment of the Westinghouse air compressor to the side of the smokebox pulled everything out of alignment and the whole job of alignment had to be redone. I was told of a V.R. 'N' class locomotive that was continually reported as a bad steamer and was examined in every possible aspect until the chimney was found to be $1/8$" out of alignment and when this was rectified the locomotive became a good steamer.

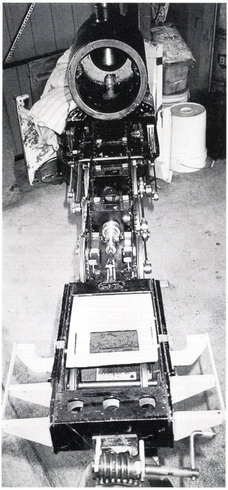
WAGR S Class 4-8-2 *GREENMOUNT*

Story and photos by Geoff Bastian

I had not long finished building a $3^1/_2$" gauge model of LBSC's *Pamela* when I started thinking of a new project. This time it would have to be something I could inspect personally to get those details which seem obvious to the drawers of model plans, but not to me!

Doug Baker of Northern Districts Model Engineering Society here in Perth, told me of some W.A.G.R. S class locomotive drawings the club had, and kindly photocopied them for me. Dennis Tobin who had started an S class, rolled up one day to see how I was progressing, and with a huge bag full of drawings signed off by the Mechanical Engineer of the day, J.A. Mills. The S was his brain child, with design starting in the 30's and engines built as resources allowed until 1947, 10 in all. These drawings were just a delight, taking one into the most innermost, unseen parts. With these and with photographs and crawling under, over and in the two S class locos, *Bakewell* on static display at East Perth terminal and *Greenmount* being restored at the time at the Bassendean Railway museum, I was off and racing.


The completed locomotive after a day's work on the Bunbury track


Early days. Note (a) steam brake cylinder ahead of ashpan between springs and (b) compensated springing to driving wheels with rods dropping to rocker beams. Centre of spring bears on axle box.

The first job was to draw up the side frames and bogie components to be laser cut. Frames were 6mm material. Then to pattern making for the cast combination frame stretcher/hornblocks for the driving wheels. It was not long before a big 5" loco started to take shape.

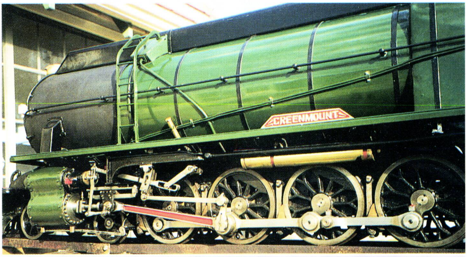
I worked to $1^1/_2$" to the foot scale which proved to be great as the original drawings were principally $1^1/_2$" and 3" to the foot, which saved no end of checking and measuring time. For example, when the side frames were received from the laser cutters, I was able to lay the plan over the frame and centre punch it wherever a bolt or rivet was shown. After checking with a pair of dividers each punch mark was drilled 2.5mm through both frames simultaneously. Thereafter the fun came from making, then seeing the components fitting the fixing holes already in place.

Bob Brown was a great help on the huge boiler, 4mm copper and the maximum size under the AMBSC Copper Code. It steams very well and effortlessly supplies the 64mm x 76mm cylinders. It lifts

GREENMOUNT Specifications

	Engine	**Tender**
Length	1.600m	0.970m
Height	0.480	0.425
Driving wheels	0.150m	
Bogie wheels	0.095m	0.095m
Stroke and bore	76 x 64	
Rated Tractive Effort	163 lb	
Brakes	Steam	Vacuum
Weight dry	449 lb	141 lb
Lubrication	Twin sight glass	
Boiler Barrel	200mm dia	
Tubes	4 x 25mm x .0487m 24 x 15mm x 0.487m	
Grate area	53200mm^2 or 82.48ins^2	
Boiler Feed Twin	15mm x 15mm wheel pumps via smoke box coil	
Injector	Vertical 40 oz 16 oz	
Regulator	$^1/_2$" Teflon Ball Valve	
Boiler pressure	90 psi	
Safety Valves	3 x 8mm bore pop safety valves	
Hand pump	Double action 15mm x 40mm, rear tender mounted	

Bob Brown does a final check of the boiler. The block and tackle is because it's too much for one man to handle — even Brownie!



This view shows the Mills trade mark 'Y' spoked driving wheels

the loaded club trains with casual ease with about 50lb in the boiler and is usually run between 50 and 70lb. There seems nothing to be gained by keeping it up to its 90lb limit. This engine has real grunt, as was intended with the original design requirement, to get over the problem of double heading trains over the old Greenmount Hill gradients in the Darling Ranges behind Perth.

So many contributed to the engine, knowingly or not, like my wife who cannot see the humour in building a loco. (She contributed the steel for the cab from her old Hoover washing machine.) Some of my tenants contributed engineering advice, some ball bearing races for the axles, ex starter motors and generators, my video repairman mate with very small bearing races from video rollers (great for motion gear), the local TAFE for the horizontal borer for the cylinders and so on.

I will always cherish the memory of climbing aboard one day at Castledare (Wilson) following the boiler test with Bob Brown and John Fowler, the Boiler Inspector, looking sternly at the untried engine. Winding it into reverse and gingerly opening the regulator for the first time in the real world of working engines, whereupon slowly and smoothly it eased its way down the steam bay track onto and over the traverser then down the long bank track to the main line. Their sudden smiles said it all, "We don't know how, but he has done it!"

The exhilaration of success made frustration and burnt fingers worth the while.

GREENMOUNT *on its first public run at the 1998 AALS Convention at Bunbury where it ran faultlessly after a minor teething running repair was performed.*

Western Australia's Steaming Orphan

by Bruce Raven

Prior to 1934 the railways of this state relied entirely on imported locomotives. They were usually of English origin although a number were from Scottish works.

However, in 1933 another English import arrived on these shores and it was not long before he took over the design office of the Chief Civil Engineer at the Midland Junction Workshops of the WAGR. That immigrant went under the name of Mills. He was Mr J A Mills and he was a master designer.

After the long years of depression and shortages, the railway was in desperate need of new locomotives and rolling stock and Mills saw an opportunity to update the motive power of the service with up to date, efficient engines at great savings to the tax payer. He set about designing a new engine of much greater tractive power than had been available in the past and he had the advantage of knowing the conditions under which it was to operate. This was to be the engine which we know today as the "S" class.

Mills' plans were for a unit of 4-8-2 wheel arrangement, the total track weight of which in operation would be 119 tons. The boiler was to be superheated to 750 degrees and built with a firebox which would efficiently burn Collie coal. The fire grate area was 40 square feet and the boiler pressure 200 pounds to the square inch. At work the tractive effort was effectively 30,685 pounds.

Because of the firebox capacity and the design it has often been claimed that Mills intentionally avoided the use of a mechanical stoker and deliberately made the fireman's life more onerous, but I do not believe that that was intended. In those days any locomotive with a capacity over 47 cubic feet had to be mechanically stoked.

The war intervened before the first engine could be built and shortages of money and materials were only exceeded by the lack of construction manpower, so time dragged by and the railway "made do" until the pressure for new power made the urgency of that need into an imperative.

The first engine came onto traffic in 1943 after having lain on the drawing board for over eight years. It was a welcome stranger and soon became a popular locomotive. Always conspicuous because of its partial streamlining, which became known to railwaymen and enthusiasts alike, as "The tin along the top", the "S" class numbers increased until there were ten in the class range, all of them outshopped from Midland Workshops. The class was also notable for the name plates on each side of the boiler platform. Each engine was named after a Western Australian mountain.

There was a time when I noted three of these units in the one rail station when *Greenmount*, *Bruce* and *Bakewell* brushed shoulders at Spencers Brook. The engines performed so well that they were often used for passenger services in the days before the first generation diesels arrived.

The "S" class was the only engine in the railways long history to be entirely conceived, designed and built in this state. It represented the very peak of railway efficiency and will always be remembered and highly thought of by the hindsight of history.

That loco was vastly more useful than Mills' other offering for wartime Australia, the Australian Standard Garratt. That engine was almost universally unpopular and no one had a good word for it. Only on the Esperance line was it thought well of by the engine crews. Elsewhere it was almost a total failure.

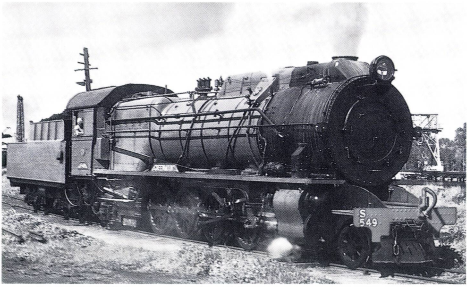
The "S" class of locomotive was written of in June 1971 although many worked on until Christmas of that year, the last day of steam working in Western Australia. The totally Mills' engines stand as a marker to his contribution to our transport efficiency and perhaps as an honour to its designer and the traditions of the railway service. S542 *Bakewell* lives on today as the last of its class in a little enclosure in the gardens at Perth Terminal. It is almost as if it is waiting to raise steam and roll out on that long track into the new dawn tomorrow. Truly it is the last of the dinosaurs.

(Reproduced from On the Trains *by Bruce Raven with permission from the author)*

The WAGR S Class 4-8-2

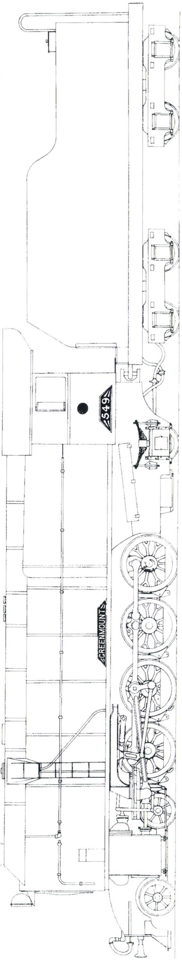
Specifications

Cylinders	19 x 24 in
Boiler pressure	200lb
Tubes	93 x 2 1/4"OD 2 x 3" OD
Flues	28 x 5 1/4"OD
Heating surface:	
	Tubes 1503 sq ft
	Firebox 170 sq ft
	Total 1673 sq ft
	Superheater448 sq ft
Tractive effort	30,685 lb
Grate area	40 sq ft
Coupled wheels	4'0"
Water capacity	3500 gallons
Coal capacity	9 tons
Total weight	119 tons
Factor of adhesion	3.8



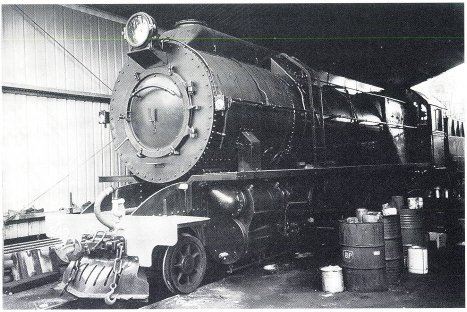
S549 GREENMOUNT *on steam trials at Midland after an overhaul in September 1970.*
Photo: G J Higham, courtesy Rail Transport Museum, Perth

S549 *GREENMOUNT* as built



Further Notes on the Western Australian S Class 4-8-2 Locomotive

By David Proctor



S549 GREENMOUNT *now preserved at the ARHS musuem at Bassendean quietly awaits amongst the running shed clutter for the next time a fire warms her innards*

The S class was the result of the work of Chief Draftsman Mills in the early to mid 1930s, and its history has been covered elsewhere by Bruce Raven. In this section we will look at some of the features of the S class which have made it a locomotive of note.

Smokebox

One of the first things the observer usually notices is the very long smokebox. This size was adopted to keep the boiler tubes to the optimum length for efficient evaporation and to keep the boiler weight within a very strict limit. (The locomotive was designed to an axle load of no more than 13 tons, as dictated by some bridges on the system). The thought was that a long smokebox would give a more even draught at the same time as it reduced spark emission. Incidentally, the boiler, as designed, was not fitted with a steam dome, but rather, steam was collected from an internal perforated collector pipe and passed into a steam pipe which emerged through the top of the front boiler ring, and led to a stop valve, mounted where the boiler and smokebox meet. It then led to the regulator which was in the smokebox. A full length cowling extended from the cab front to the front of the smokebox, but later, after a steam dome was fiited, the cowling was reduced to a shortened section covering the area from the dome forward.

Cylinders

Another item which grabs attention is the very fat shape of the cylinder casting around the steam chest area, and the bulbous end covers. These are the result of unusually large steam passages and the fact that the end covers incorporate the exhaust passages and were also a feature on the Msa class Garratts. A variation on this theme was also to be found on Mills' other well known design, the Australian Standard Garratt, which also featured the same style of wheels with the 'Y' shaped spokes. (The leading and third coupled wheels were flangeless)

Valve gear

The Walschaerts gear is unique in Western Australia in that the radius rod extends behind the expansion link and is provided with a rectangular slot to accommodate a sliding block attached to the reversing arm. This replaces the normal lifting link attached to the radius rod in front of the expansion link. While in this area, the crosshead originally was a variation of the Laird type, but unusual in that it was split and secured to the piston rod by clamping over three integral rings on the rod with a series of bolts. In later years, these were replaced by the more common taper fit crosshead and modified slide bars.

Trailing truck

The trailing truck was the Cartazzi type, where the axleboxes are independent of each other and guided laterally in angled horn-blocks. The centering is controlled by the weight of the engine acting on inclined slides between the top of each axlebox and the underside of its springs. The horn faces are flat instead of curved, and self-aligning bearing brasses absorb any small angular motion when entering curves.

To put it briefly, the S is a unique locomotive.

WAGR S Class locomotives

No	Name	In Service	Withdrawn	Notes
541	Bruce	11.2.1943	17.6.1971	originally 476 renumbered 6.10.1945
542	Bakewell	26.6.1943	17.6.1971[1]	originally 477 renumbered 21.9.1945 large tender[2]
543	Brockman	17.9.1943	16.6.1971	originally 478 renumbered 9.10.1945 large tender[2]
544	Hallowell	26.10.1945	17.6.1971	large tender[2]
545	Dale	15.12.1945	17.6.1971	large tender[2]
546	Egerton	5.7.1947	17.6.1971	
547	Lindsay	9.8.1947	17.6.1971[1]	large tender[2]
548	Gardner	15.9.1947	17.6.1971	
549	Greenmount	9.10.1947	14.8.1972[1]	
550	Hardie	10.11.1947	17.6.1971	

[1] 542 displayed outside Perth terminal for many years, returned to tour service by ARHS in 1995
547 sold to Geelong Steam Preservation Society, Queenscliff, Victoria
549 preserved at the ARHS museum at Bassendean

[2] large tender — some tenders were rebuilt to reduce coal capacity from 9 to 7 tons and increase water capacity from 3500 to 5000 gallons

Convention 2000

Wheels and Whistles — Blenheim NZ

by David Proctor

Photos by the author unless credited otherwise

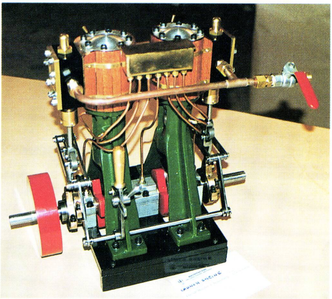
New Zealand's increasingly popular two-yearly International Model Engineering Convention was this year held in Blenheim from 6 to 11 January. Blenheim is the hub of the Marlborough region at the top of the South Island. The district is noted for the Marlborough Sounds, mussel and salmon farming, fruit, cheese, salt production at Lake Grassmere and most notably, it is a major wine producing region with vineyards extending many kilometres up the Wairau Valley.

Brayshaw Park, 2 kilometres from the town centre is an amazing place. As well as being the home of the Marlborough Associated Modellers Society, the park is also home to the Vintage Car Club, the Vintage Farm Machinery Society and Marlborough Historical Society, all of whom have interesting museum displays. Largest is the Vintage Farm Machinery Society who have a vast range of all types of agricultural equipment covering the entire period of European settlement in New Zealand. I have never seen so many tractors or different models in one location. The 2-foot gauge Blenheim Riverside Railway also operates from the park. Brayshaw Park is named after a gentleman who made it his mission in life to collect all possible farm equipment before it disappeared and stored it in the area now occupied by the park.

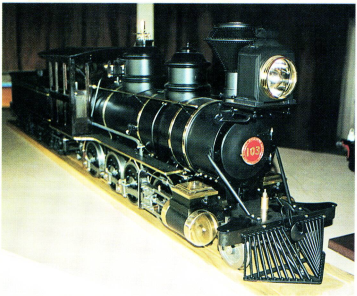
The MAMS facilities

The Marlborough Associated Modellers Society (MAMS) complex includes an elevated track catering for 2½", 3½" and 5" gauges, a 5" and 7¼" ground level track, a model boat pond and a tethered racing car track.

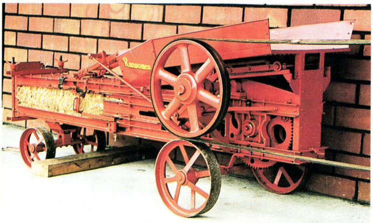
The elevated track is a figure eight configuration with a height variation of 1.75 metres achieved by 1 in 100 grades. The track is 403.8 metres long and includes some interesting features like a long truss style bridge and a magnificent wooden trestle viaduct. If you were driving on the elevated track, upon leaving the station you would head off on a gradual reverse curve before you begin the ascent up a long straight grade, where you come to a 90 degree curve to the right, over the ground level tunnel, straighten a



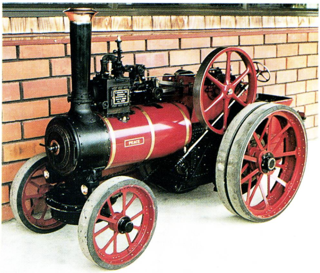
John Beauchamp's twin cylinder marine engine will eventually power a 16 ft. steamboat in Christchurch



Win Holdaway of Blenheim is building this 5" gauge NZR T class loco



This Ransomes hay binder was built by Graham McElroy of Christchurch in 3" scale to be operated by his 3" Allchin traction engine ...



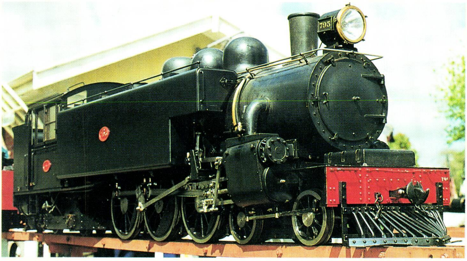
...and this is Graham McElroy's 3" Allchin traction engine

little before curving to the right again and levelling off. The track then almost straightens out and crosses a bridge over the ground level track thence a right hand curve followed by a straight where the track crosses over itself and the entrance to the ground level yard by means of a long bridge. Over the bridge you begin a gentle curve to the left, straighten up and over the viaduct, and descend on a long sweeping left hand curve back to the station.

The ground level track is fairly new, having only been opened about eight months prior to the convention. This track is 410 metres long with a maximum gradient of 1 in 50. Construction is somewhat unusual for club tracks in this part of the world in that the rails are attached to the sleepers by cast aluminium chairs, some 27,000 of them. This style was chosen to facilitate the operation of signals by track circuitry. The layout of the ground level track could be best described as a large oval but it does include reverse curves, three straights, a tunnel, interesting grades, a level crossing and a large yard. From a driver's viewpoint, you leave the station via a long left hand curve until you have turned 160 degrees, cross a level crossing on the straight, around a sharp descending left/right reverse curve under the elevated track, down a cutting, under the elevated again and up a stiffly graded short straight, around a long sweeping 180 degree left hand curve again, down a descending straight which finishes with a short reverse curve into the tunnel and then a long climb up to the entrance to the yard and back to the station.

The Exhibition

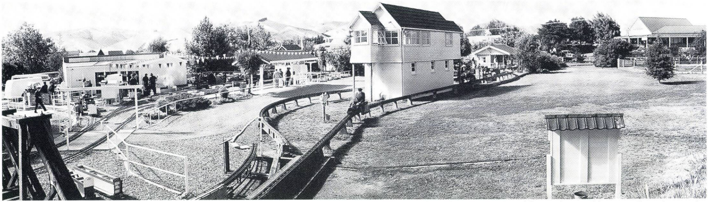
A wide-ranging static display of models completed and under construction, has become a major part of the New Zealand convention scene. The exhibition this year was not as large as the Tauranga one two years ago, but it was still pretty impressive. The


Win Holdaway of Blenheim built this 5" gauge NZR Wab class 4-6-4T loco now owned by Ken Sullivan of Christchurch. The Wab is a tank version of the famous Ab class Pacific.

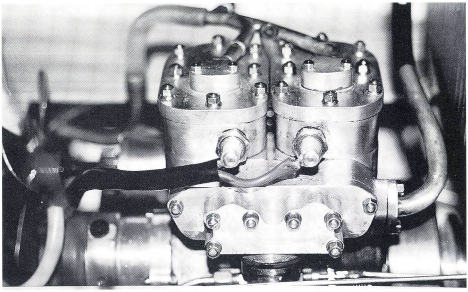
Bruce Fordyce of Hawkes Bay MES has just climbed the grade from the cutting under the elevated track on this 2-4+4-2 Mallett built by Harold Sinclair Photo: Peter Holdaway

One of the vessels which was spotted on the pond

This 3" scale Durham & North Yorkshire traction engine belongs to Russell Arnott from Queenstown



This scene from the elevated bridge shows from left, the ground level roundhouse and yard, station, signal box, elevated bays and station and the building on the right housed the exhibition. The traverser in the foreground allows 5" locos to move from the elevated to ground level



Charlie Crossan (Dunedin) made this 2-cyl. water cooled Seagull *engine for his boat* Amy F.

models on display covered many facets of model engineering and were all eligible to contest the Canterbury Award for the best in show. The winning model is chosen by invited judges, this time all from overseas, being Ken Brunskill (USA), Alan Bibby (UK) and yours truly. What follows is a representative description of what was on display, limited only by the amount of available space in these pages.

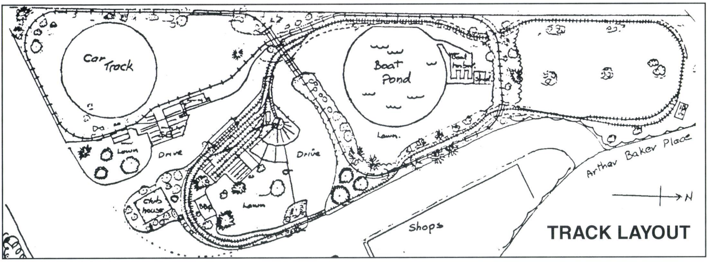
The boat *Amy F* by Charlie Crossan of Dunedin looked impressive enough before the hatch was removed to reveal a beautifully manufactured 2-cylinder water cooled *Seagull* engine to Edgar T Westbury's design.

Next up was a finely executed 5" gauge model of a New Zealand Railways electric locomotive, Ec7, built by Russ Walker and currently owned by Brent Coburn of Picton. Sitting right next to it was another model owned by Brent, a 3½" gauge model of an early NZR diesel electric locomotive, Dg785. This model of an English Electric built prototype was made by Bill Jackson.

Glen Christoffersen from California invariably brings along something for display. This year he brought a Sterling heat engine, a replica of an engine designed and built for NASA in 1992. The Sterling engine has no intake or exhaust, operating instead on thermal expansion and contraction of an enclosed volume of working fluid, which in this model is air. Basically the engine comprises two horizontal aluminium discs one of which is heated or cooled to create a temperature differential and an enclosed Styrofoam disc ("displacer") which moves up and down, forcing the air against the opposite plate which either cools or heats it. This causes expansion or contraction that drives a power cylinder which in turn drives the displacer to a new position and the cycle repeats. In the case of Glen's model placing a bowl of hot water under the model creates the heat difference. (See photo caption for some statistics)

Convention Convenor Win Holdaway of Blenheim is well on the way to finishing his 5" gauge model of a 2-8-0 NZR 'T' class loco, the prototype of which was built by Baldwin in 1879.

The star of the show was a 2" scale Atkinson 3-way tipper truck being built by Colin Brittenden of Christchurch. The workmanship on this award-winning model is superb, and the parts, which can-



TRACK LAYOUT

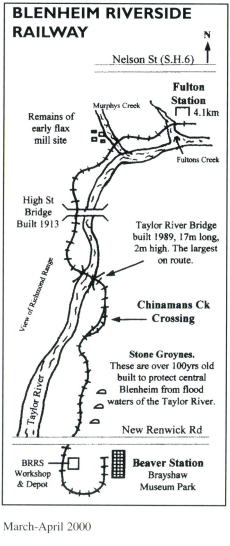
not normally be seen, are just as perfect. The photos convey better than words why Colin won the Canterbury Award.

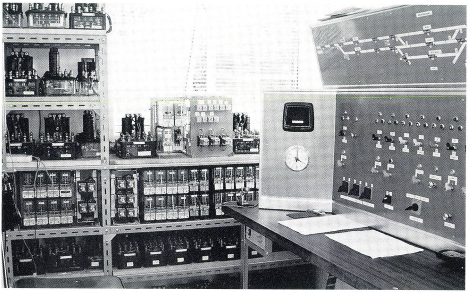
Next up in the display was a $2^{1}/_{2}$" LMS 2-6-0 2968 built to a LBSC design by Ron Brown and overhauled by Jim Woods of Dunedin. John Brighton of Invercargill chose a much earlier era when he built his model of Trevithick's Peny-Darren locomotive.

John Beauchamp of Christchurch has built a twin cylinder launch engine which will eventually power a 16ft steamboat. Graham McElroy of Christchurch went for something bigger with his Steam Launch Engine. All he needs now is the boat to mount this 3x5x3 engine in, and rumour has it that it could happen. Another item (or should that be items) from Graham, but too large for the tables was his 3" Allchin traction engine with belt attached to his Ransomes hay binder, both outstanding models.

An exquisite little Hit and Miss engine was next in line. Jock Miller of Christchurch built this, and when he started it up it ran as sweet as it looked.

Ken McIntyre from the host club seems to have an infinite variety of interests. The end of one table was taken up with his Stent tool and cutter grinder and various pieces of associated equipment, while three of his tethered racing cars were on display opposite and he had locomotives on both the elevated and ground level railways outside.


BLENHEIM RIVERSIDE RAILWAY
N
Nelson St (S.H.6)
Fulton Station
4.1km
Murphys Creek
Remains of early flax mill site
Fultons Creek
High St Bridge Built 1913
Taylor River Bridge built 1989, 17m long, 2m high. The largest on route.
View of Richmond Range
Chinamans Ck Crossing
Stone Groynes. These are over 100yrs old built to protect central Blenheim from flood waters of the Taylor River.
Taylor River
New Renwick Rd
BRRS Workshop & Depot
Beaver Station
Brayshaw Museum Park


The signal box uses components from a full size counterpart.

Peter Holdaway (Blenheim) placed a lovely little $2^{1}/_{2}$" gauge NZR Ab class loco on display. It was built some years ago by his father, Les. It is a model of Ab608, which was named *Passchendaele* in memory of the large number of New Zealand soldiers who lost their lives in the place of that name during the First World War. If memory serves me correctly it was the only NZR steam loco to be officially named in service since 1890.

Turning to locos a bit larger, the next item was Jim Woods' (from Dunedin) part built Isle of Man no. 5 *Mona* in 5" gauge which was dwarfed by the next model. Alan Familton from Christchurch is building a $7^{1}/_{4}$" *Bunyip* as currently being described in AME and he had his frames and wheels on display. The spoked wheels are all cut from solid steel.

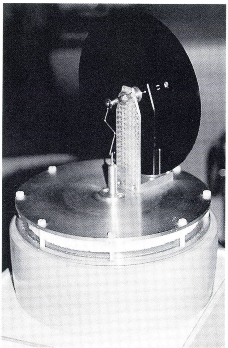
Murray Lane from Auckland displayed his 18-cylinder Gnome Monosoupape Aero engine. In this type of rotary engine the cylinders and crankcase revolve around the stationary crankshaft. Readers may recall that Murray had this 1/3 scale model on display last year at the AALS Convention at Lake Macquarie.

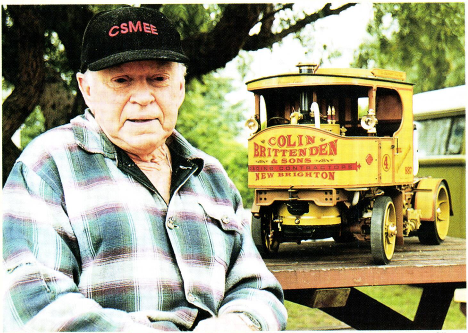
There were many other models, all a credit to their builders, but space prevents them being described here. Let's take a brief look at the Convention day by day.

Thursday

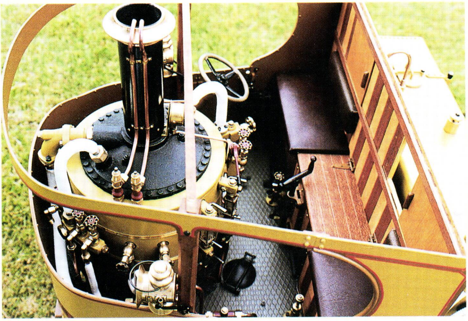
The day was off to a very cloudy start and by the time I arrived at the track, several locos were already running. The first port of call was the clubhouse to register and then to have a good look around the complex. First off were the tracks (already described) and then the boat pond. It is fairly large, circular and 100 feet diameter. A pylon in the centre suggests that pylon racing boats have been used here, but there was no sign of activity this morning. After noting the vintage car shed and the tractor sheds, the old shops and the Archives Museum, I decided to head in the direction of the building which housed the exhibition to get some photos before the crowds arrived.

The exhibits were under the watchful eyes of Peter Holdaway, who during the course of the weekend turned out to be both very helpful and to be great company. Peter was quite happy for me to move models around in order to get better shots of them, and that is how much of Thursday was passed. Whilst I was taking my photos and the trains were running, two full size traction engines were performing on the roads through the park. One was a Marshall and the other a Burrell


Glen Christoffersen's Sterling engine will run on a temperature differential of 6°C between the aluminium plates, with thermal efficiency of 1 to 2%. Boiling water at one plate and ice at the other would increase it to 27%. Compression ratio is 1.004:1 and power output is a fraction of a watt.



(Above) Colin Brittenden from Christchurch sits with his Canterbury Award winning 2" Atkinson 3-way tip truck. (Below) A look inside the cab at some of the beautiful detail and the high standard of Colin's work. Top photo: Peter Holdaway



of 1909 vintage. Both were fitted with ex NZR Ja class loco whistles and consequently sounded very loud and to my mind, rather beautiful. They had to share the roads with Monty George's 4" scale Fowler from New Plymouth.

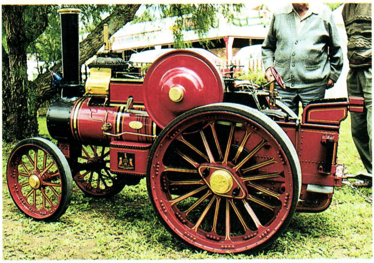
Later in the afternoon I took a ride on a bigger train than what the model engineers were running. The Blenheim Riverside Railway runs from within Brayshaw Park through a very scenic riverside reserve for 4.1 kilometres in the direction of the city centre. It is 2ft gauge and is currently operated with two industrial diesel locos, although work has started on restoring a steamer to do the job. The local council would like the railway to be extended right into the city.

The day was rounded off with drinks and nibbles at the Redwood Tavern, which is not far from the track. Having started out as a model engineer in New Zealand it was not surprising that during the day I met up with many people whom I had not seen for many years.

Friday

Many more people arrived and the tracks were both busy. Although it was another cloudy start the sun was out by 10:00 am and it turned into a rather hot day. I spent some time at the controls of Dave Giles' new gas fired Shay *Enterprise*. This was a new experience for me as I always imagined that with gas firing you would sit there with little to do. I was wrong. Of course there are the usual things one does like watching the water level, keeping an eye on the train and track, observing signals, etc, but one also has to keep a fairly close eye on the gas as well. Turn the flame back when stopped, turn it up when ready to go and making sure the level is right for the conditions. Failure to control the flame can lead to it being starved for air and the fire going out, too high and you waste gas and steam. In a word — fun! Clean too! The Shay is beautifully built and very powerful.

About 1:00pm preparations began for the Official Opening and the Grand Parade which duly took place when a local MP declared the proceedings open. The num-



This fine Fowler engine is the pride of Monty George of New Plymouth

This GP38 belongs to John Romanes of Havelock North ber of trains on the ground level caused some congestion for a while, but eventually things came right and everyone settled down to steady afternoon. Harold Sinclair offered me drive of his Mallet and of course, I accepted! It is a very easy engine to drive and again a new experience, as I had not driven an articulated loco before. The big traction engines were running again as they did every day, along with some smaller ones. There was Monty George's Fowler as already mentioned. Russell Arnott from Queenstown ran his 3" scale Durham & North Yorkshire and Alan Familton from Rolleston had his 8HP Burrell in steam. Bevan Wilson from Invercargill had his 2½" Allchin on the go.

The day wrapped up with an excellent BBQ tea followed by some evening running.

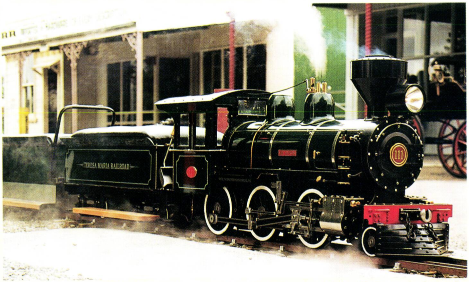
Saturday

Today didn't look very promising — the cloudiest day yet with a threatening look of rain. Roger Reynolds from Whangarei showed me some photos of progress on their new track along with a plan of the completed layout. It would appear that eventually they would have a very impressive track, which, from a driver's viewpoint, will be an excellent one to drive on with some good grades and a very nice location. Located a few kilometres out of town, it is sharing its location with a local museum, which should add to the overall attraction. Wonder when they will be ready to host a convention!

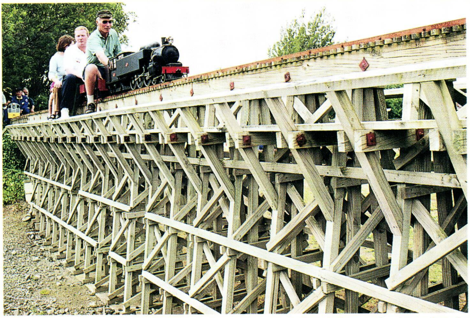
After a quick check to photograph any new exhibits that may have arrived, I decided to spend the morning with the lads at the elevated track. Jock Millar brought me up to date with what is happening at his club in Christchurch, where they are about to embark on a ground level track to cater for 7¼" gauge trains. At 11:00am the organisers managed to get most of us together in one spot for the official Convention photo.

There were not as many locos on either track today as several of the visitors were off on other organised activities. There were Wine Trail tours of the local vineyards, and Craft Trail/Heritage tours around the district. Some people went to Kaikoura for the whale watching but the weather prevented the boats from going out. Did I mention that by this time it was very windy and the occasional shower drizzled across.

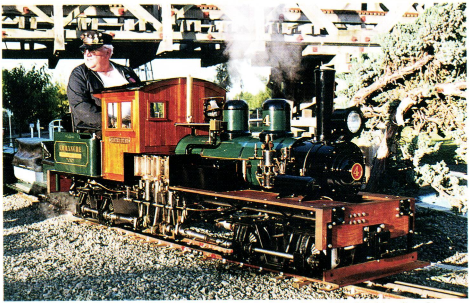
After lunch I climbed up with Murray Bown for a drive of the full size Burrell. I had forgotten just how high up you are on these engines and how powerful they feel. We drove around the streets in the park and then up the hill to go around one of the stationary engine sheds. As we rounded the corner we were shot at by three bird's nests. It transpired that in the shed they had just fired up an old diesel engine, which had a very large exhaust pipe that birds had been nesting in. It happened to fire just as we went past the spot where the exhaust comes out through the wall.



A scene from the old West? Terry Armstrong from Hamilton has left his Sir Byron *in front of a row of old shops. The locomotive is based on Dave Giles' Phantom design.*



Ken Sullivan's 5" NZR Wab class crosses the impressive timber viaduct on the elevated track



Late in the afternoon, the last rays of the sun catch Ken Brunskill of Golden Gate Live Steamers (USA) bringing Dave Giles' big Shay under the elevated track into the yard.

Another great BBQ dinner was enjoyed as the rain disappeared to allow a cool night of running. Many owners took the opportunity to get their locos on the track, and Gavin McCabe offered me a drive of his Harold Sinclair built 2-6-2 Redwood Valley RR 66. Again a very comfortable engine to drive. We kept going until about 10 o'clock and then decided to call it quits.

Sunday

Sunny! Many locos were on the tracks early and before the day was very old several boats began appearing on the pond.

The MEANZ meeting was held upstairs in the elevated track signal box at 2:00pm. By the time the various club delegates all got inside it was very cosy. I attended to present a report from the AALS on behalf of President Barry Glover. After the required formalities were over discussion moved on to boiler codes and it was agreed to appoint Ian Fanshawe (absent) or if he is not available, Jock Miller, both of Christchurch as the AMBSC New Zealand contact person. After I presented the AALS report, Alan Bibby (UK) and Ken Brunskill (USA) were asked to say a few words on the situation in their respective countries. The Christchurch submission to host the 2004 Convention was accepted.

Later in the afternoon Ken McIntyre gave us a demonstration of his tethered cars in action. As an almost invisible blur at 224kph (140 mph), I decided to pass on photographing them in action.

Sunday evening was the occasion for the official dinner, held at the Redwood Tavern. After a very pleasant meal and some joke telling, the time came for the presentation of the various awards. The winner of the **Canterbury Award** was Colin Brittenden of Christchurch for his 2 scale Atkinson 3-way tipper truck. Colin was not at the dinner to receive the trophy personally.

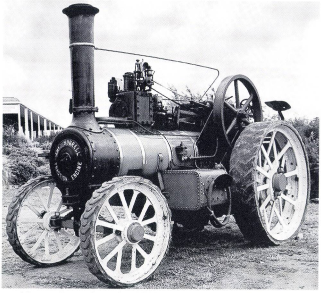
This 5" gauge Brittania, Sir Christopher Wren *belongs to Ian Fanshawe of Christchurch*

Bill Parker from MBM Model Engineering Supplies presented the **MBM Award for Most Popular Locomotive** to Dave Giles of Auckland for his Comanche Mining & Smelting Co. Shay.

It was then Dave's turn to get up and present the **Ikon Cup** for the best locomotive built to the **Phantom** design. This year it went to Terry and Ben Armstrong of Hamilton for their *Sir Byron*.

Blenheim Club Patron John Moody then made presentations of locally produced liqueur gift sets to those who travelled from overseas and the furthest in New Zealand. The recipients were Glen Christoffersen, Jim Dameron, Ken Brunskill and Fred Stringer from the USA, Alan Bibby from the UK, Col Etwell, Alf Bond and yours truly from Australia and Roger Reynolds from Whangarei.

Various other "awards" were given out, some of the more notable being **Crunchie Bar Awards** to Ken McIntyre for stalling the official train, Bill Parker and Monty George for running out of water on Monty's traction engine (they each received a bottle of water with their Crunchie Bar). A special award of a can of very 'stylish' undies went to Dave Giles for the effort he put into trying to solve the problem of lack of brakes on his train, before realising that he hadn't hooked the loco up yet.



Murray Bown kept this 1909 Burrell in steam all weekend

Monday

Down at the track it was obviously winding up day as some people were packing up ready to depart very early. However several others still put in a full day. Peter Holdaway drove me into town to get my films processed, and then took me for a drive around Blenheim, which was very interesting. It is astounding how the wine industry has totally taken over most of the available land in the last decade or two.

Back at the track I had another drive of the Shay. I don't know how many times I drove it over the weekend but I really appreciated it. Thanks, Dave. The day got colder as it got older. When there were only two or three locos left on the ground level track the decision was made to have a shot at reverse direction running for a while. This presented some great opportunities for photography as reverse running provides a better range of backgrounds on this track, and it was interesting how different the track felt to drive on when the up grades became down grades, etc.

Murray Lane decided to light up his 5" Speedy *(Gonzales)* so that he could blow it down before packing it away, but when he got it onto the track, the blow down was deferred for a while. When he offered me a go at the regulator I jumped at the opportunity to have a go on the elevated track. I virtually had the track to myself so was able to go round and round without stopping. Great stuff! As nice as the big locos are, I still get more pleasure and satisfaction from driving a smaller one.

The day finished with a BBQ and drinks followed by many farewells.

Conclusion

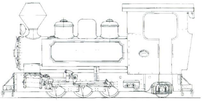
The Convention was a total success and the members of the MAMS are to be congratulated on what they achieved with a small number of members. 182 people registered and with them they brought 67 locomotives and 6 traction engines plus the static exhibits. If you are interested, the statistical breakdown of locomotives in attendance is

9 x **3½"** 36 x **5"** 22 x **7¼"**

2002 — The next convention is to be hosted by Palmerston North Society of Model Engineers, Marriner Reserve, Palmerston North 10 to 14 January 2002.

2004 — The 2004 Convention will be hosted by the Canterbury Society of Model and Experimental Engineers, Christchurch in January 2004.

Bunyip



A Bundaberg Fowler 0-6-2T in 7¹/₄" gauge — part 11

by Ian Smith

Drawings and photos by the author unless credited otherwise

Return crank

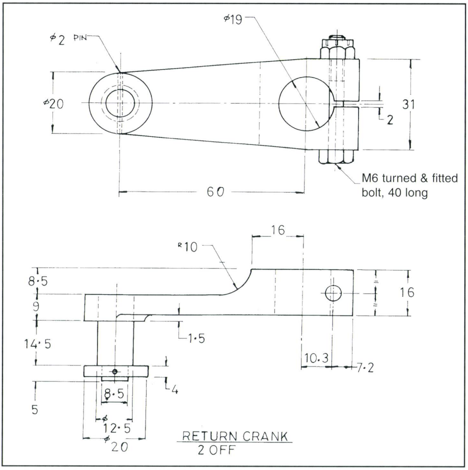
The return crank is machined out of a piece of BMS 32mm wide x 18mm thick x 88mm long. Set the machine vice up on the milling machine table and machine the block to 31mm wide and 17.5mm thick and square one end off. Put the crank on parallel strips in the vice to drill the 19mm and 12.5mm holes. Using the centre finder in the milling head, find one edge of the 31mm side and come in 15.5mm, and find the squared off end edge and come in 17.5mm. Centre drill and drill and ream the 19mm hole. If you have no reamer use the boring head to bore the 19mm hole. To get a good tight push-on fit on the crank pin, you will need to have made a plug gauge the same size as the crank pin. Move the table along another 60mm and centre and drill for the 12.5mm crank pin. To get a good fit in the 12.5mm hole I would double drill the hole by first drilling a 12.3mm hole then finish with the 12.5mm drill with the cutting edge honed off a little (it will then act a bit like a reamer).

Turn the return crank in the vice 90°. With a 19mm diameter steel bung in the hole so that when you drill the clamping and keying hole in the side, the drill will not wander when it breaks into the 19mm bore. Move to the 19mm hole end of the return crank and using the centre finder, find the back face edge then come in 8mm, now find the machined square end edge and come in 7.2mm, centre and drill 5.8mm for 6mm reamer. DO NOT REAM YET! That will be done on the final setting of the valve gear when you will use the 5.8mm hole to drill the crank pin first and then put the 6mm reamer through the whole assembly.

While the crank is held on its side, mount a 2mm slitting saw on an arbor and cut the 2mm slot in the end of the crank into the centre of the 19mm bore. Turn the crank back 90° in the vice on parallel strips and machine off 8.5mm from the 12.5mm bore end till you come to 43.5mm from the 19mm bore end of the crank. Mount a 10mm radius ballnose slot drill and machine the 10mm radius. Turn the crank 180° in the vice and machine off 1.5mm starting from the 19mm bore end to about 65mm.

In the lathe, turn up a stepped 12.5mm diameter mandrel with a thread turned or tapped in the end to clamp the end of the crank on to it. Running the lathe slowly with a small radius tool, turn the 1.5mm step to 20mm diameter. It will help you to mark out the taper on the sides. Come in 17.5mm from the 19mm bore end mark then lay the rule on the 20mm boss and on to the 17.5mm mark and scribe a line touching both places. To machine the sides, return to the milling machine and set the crank on its side and with 3mm square strip of steel, lay it on top of the vice jaw. Set the line marked on the crank to the top of the 3mm strip with a 8.5mm packer behind the crank and clamp up in the vice and machine to the line. Repeat on the other side. File up the 20mm diameter boss to the turned size, and file and polish the crank before fitting the 12.5mm diameter pin.

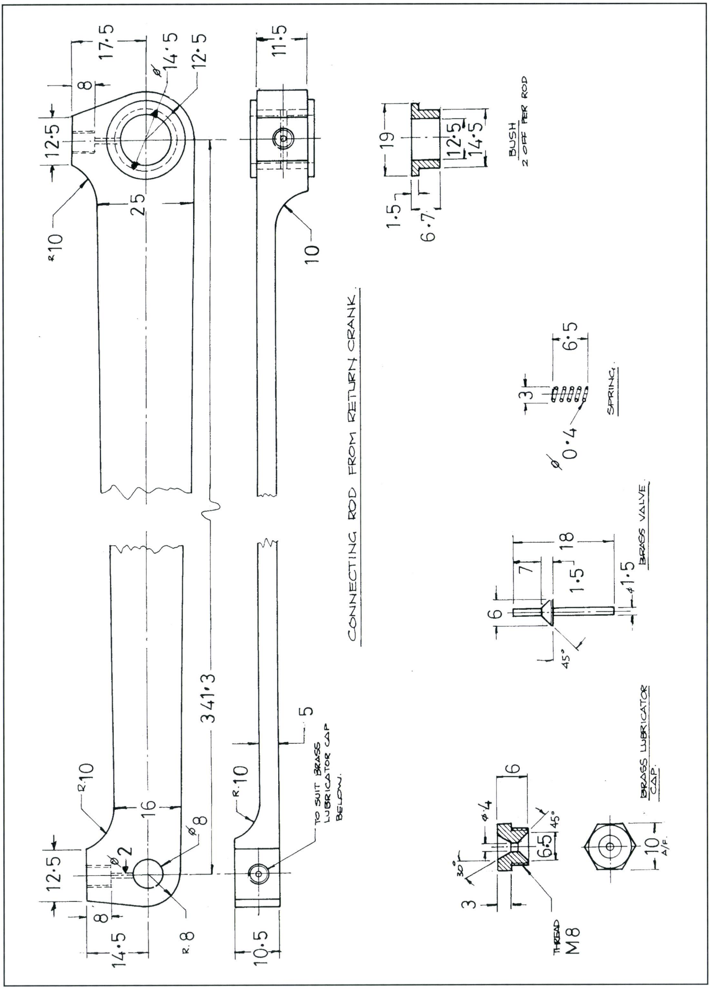
The pin is turned from silver steel, a simple turning exercise. The main thing is the press fit in the 12.5mm bore and the length of 14.5mm long between the boss and the 8.5mm diameter step on the end of the shaft. Make a 20mm diameter x 4mm wide with a 8.5mm bore to fit the end of shaft. When all assembled drill for 2mm diameter pin and mark the ends so you will know which way around it goes when assembling.



Return crank rod

Before I made the return crank rods I set up the valves and set the return crank as close as I could and then made a dummy rod (like I used for getting the centres of the coupling rods) to finally set the return crank and get the length of the return crank rod.

The rods can be machined out of solid or fabricated steel. I fabricated mine. Use a piece of 32mm wide x 5mm thick x 365mm long BMS for the rod and silver solder the bosses on each end. On the large end use a piece of BMS 32mm wide x 7mm thick x 40mm long, and the small end 32mm wide x 6mm thick x 35mm


CONNECTING ROD FROM RETURN CRANK.
BUSH
2 OFF PER ROD
SPRING.
BRASS VALVE.
BRASS LUBRICATOR CAP.
TO SUIT BRASS LUBRICATOR CAP BELOW.
THREAD M8
341·3
R10
R.10
R.8
ø8
ø2
ø14·5
12·5
17·5
8
25
16
14·5
10
10·5
11·5
5
19
1·5
6·7
ø0·4
3
6·5
18
7
6
ø1·5
45°
ø4
30°
10 A/F.

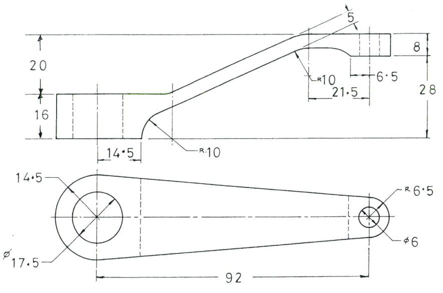
long. Do not forget there are right and left hand rods. Silver solder the boss onto the rod, let the rod cool and clean off the flux. Set the rod up on the milling machine table on parallel strips, and machine the bosses to thickness 10.5mm on the small end and 11.5mm on the large end. Mark out the centre line on the rod, set the centre line parallel to the table travel, set the milling head on the centre line, come in 13mm from the edge of the large boss centre and drill or bore to 14.5mm. Move the table along another 341.3mm, centre and drill and ream 8mm. With the both holes finished mark out the ends and the taper on the rod, mill to the line then draw file and polish. If you are using the dummy rod for setting of the 341.3mm centre, follow the coupling rod instructions. The holes for the oilers are drilled and tapped the same way as for the other rods you have made. Start with a 2mm hole drilled into the 8mm and 14.5mm then open out to M 8, tapping to 9mm deep flat bottom and tap. The turning of the bronze bushes need no explanation in the making, except they do not meet in the centre of the rod. It makes an oil groove and an oil reservoir. The pivot bolt for the 8mm end is shown on the Radius Link drawing. Make the oilers up the same way as you did for the other rods.

Lifting lever

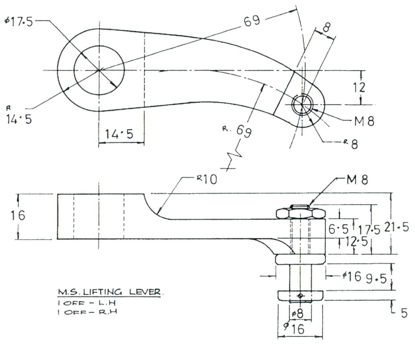
These are right and left hand links and they are machined out of 35mm wide x 25mm thick x 95mm long BMS. Using the surface plate and the Vernier height gauge, mark out the lifting rod. Lay the link on its side on the surface table, set the height gauge to the top surface of the link then come down 14.5mm and scribe the centre line of the 17.5mm hole along the full length of the link. Move down another 12mm and scribe the centre line for the M8 hole, turn the link on its end and zero the height gauge to the surface plate, face, then come up 14.5mm and mark the centre line for the 17.5mm hole. Highly centre pop the centre, set the dividers to 69mm and scribe a line through the 12mm line — that will give the position of the M8 hole. Pick up the 17.5mm hole centre line and the M8 hole and scribe the centre line of the link and mark out the shape of the link. Set the link up in the vice on the milling machine and using the centre finder, pick up the centre of the 17.5mm hole, centre and drill or bore the 17.5mm hole. Using a pointer held in the milling head, find the centre of the M8 hole, centre drill and tap M8.

Machine the link to a thickness of 21.5mm. Machine 9.5mm off the back, face to 24.5mm from the centre of the 17.5mm hole and using a 10mm radius ballnose end mill, machine the radius. Turn the link 180° in the vice and machine to 16mm thick to within 18mm from the centre of the M8 hole. Using the radius cutter machine the radius, cut out the shape of the link and draw file and polish link.

The pin is a simple turning exercise. When fitting the lifting link slide on a piece of photocopy paper to give a little side clearance when fitting the collar and drill and fit a 2mm roll pin.



M.S. REVERSING LEVER.
1 OFF.

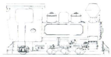


M.S. LIFTING LEVER.
1 OFF – L.H
1 OFF – R.H

Reversing lever

The reversing lever is made out of 30mm wide x 16mm thick x 125mm long BMS. It is machined and bent to shape. Set the lever up in the in the vice on the milling machine and using the centre finder, find the centre of the 17.5mm hole. Machine the hole the same way you machined the lifting lever 17.5mm bore. Set lever on parallel strips high enough to mill down to 5mm, machine down to 8mm thick to 25.5mm from the centre of the 17.5mm bore and then starting 30mm from the 6mm hole end, machine off another 3mm which will bring it to 5mm thick. Using a 10mm radius ballnose slot drill machine the two radii, mark out and cut out a template the shape of the bends and bend the lever to shape. Return the lever to the vice on the milling machine with the bend up and using the centre finder, find the centre of the 17.5mm bore. Move the table travel along another 92mm, centre and drill and ream 6mm. Mark out the shape of the lever, machine to size, draw file and polish.

To be continued ...



Sparks 'n' Arcs

Notes on Model Traction Motors

with Stan Allison

Drawings for publication by Peter Hall

Field weakening

A model traction motor needs to develop enough torque at starting to move the loco with an acceptable size load without wheel spin, to maintain a steady average rate of acceleration up to the maximum notch setting of the speed lever and then to attain an acceptable maximum speed on the level.

Once the speed lever has reached the maximum notch the motor will continue to accelerate but with decreasing torque until a point of balance is reached where the total train resistance to movement equals the Tractive Effort (TE) being delivered to the driving wheel rims — maximum speed.

Adequate torque at starting can possibly mean a too low maximum speed but this can be overcome by Field Weakening. This allows more armature torque and speed to develop and thus a higher top speed is attainable. This can be done two ways

A. by shunting off a percentage of the field current or

B. by shorting out a percentage of the field coil turns.

Shunting the field current or shorting out turns of one field coil more than another has no noticeable adverse effect. Field weakening is switched in only after the speed lever has reached the maximum speed notch.

With method **A** the very low resistance of the field coil cannot be measured with an ordinary ohm-meter, but rather a voltage drop method is used. We don't need to know the actual field coil resistance, only that the shunt is drawing off, say 25% of the field current as in **Figure 1**.

The value of resistance to shunt off the desire amount of current can be arrived at with the circuit in **Figure 2**.

The exact value of current flow **I** is not important but needs to be sizeable, say about 10 amps. For 25% shunt, slide the point of contact (**C**) along the resistance wire until volts at **b-c** is three times the volts at **a-b**. E.g. if the volts at **a-b** is 100 millivolts (0.1volt) the length of resistance wire for a 25% shunt needs to give a reading of 300 millivolts (0.3 volts) at **b-c**.

The shunt wire gauge needs to be heavy enough so as not to get more than mildly warm in service.

The method **B** above explains itself — provided the field coils have tappings.

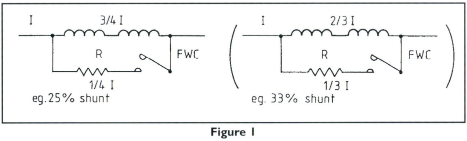


Figure 1

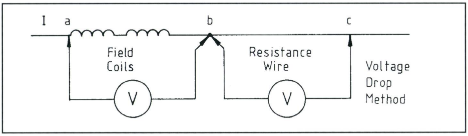


Figure 2

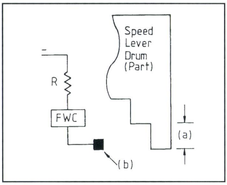


Figure 3. Field weakening control for single series motors

(a) — extra width and an extra notch step on the speed lever drum.

(b) — extra contact finger to contact drum one notch past maximum speed notch.

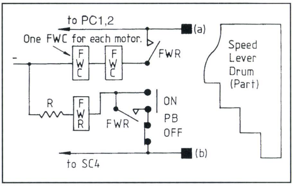


Figure 4. Field weakening control for series/parallel motors (without altering speed lever drum)

(a) Parallel contact finger PC

(b) Maximum speed contact finger SC4

FWR Field Weakening Relay

FWC F.W. contactor

PB On/off push buttons

With speed lever at maximum, pushing the ON button will close (make) FWR and FWC. FWR latch contact holds FWR and FWC "made" until the OFF button is pressed or the speed lever is moved away from maximum speed notch.

Meters

To measure resistance that is too low to read accurately on an ohm-meter use this voltage drop method (**Figure 5**).

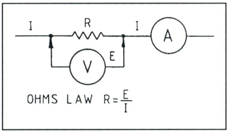


Figure 5

e.g. say E = 150 millivolts (0.15^{v}) and I = 5 amps, therefore R = $^{.15}/_{5}$ = 0.03 ohms.

The voltmeter must be connected to the ends of the resistor not to the cables/wires supplying the current to the resistor.

Most digital multimeters will read 10 amps (current up to say 20 amps can be measured if read off within two to three seconds) in addition to volts and ohms.

Also very useful is an analogue volt meter in the range of 0-20 volts for reading 8-15 volts (say panel type meter Jaycar QP5020, Dick Smith Q2041). Compared with hand held analogue multimeters these just mentioned have reasonably open scales and are easier to read. Mount the meter in a small protective stand; use with care the first time to find out whether they need external resistors. In any case cross check the meter with say a digital multi meter for accuracy at mid-scale. To read the range 0-40 volts for 24 volt use, add an external resistor equal to the total resistance of the 0-20 volt meter and double the reading

R is multiplier of same resistance as meter to double the scale to read 40 volts full scale deflection (FSD)

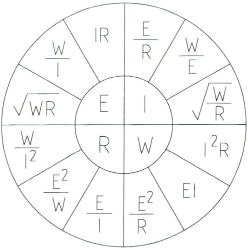
An analogue meter has an open scale with an indicating needle whilst a digital meter gives the readings in actual figures.

If using a digital volt meter connected across the terminals of a working DC motor, the reading will vary so much as to be useless. This meter responds to instantaneous spikes of voltage caused by commutator sparking although the sparks may not be visible.

An analogue meter will give a reasonably stable reading because the inertia of the meter movement cancels out the voltage spikes.

Next time we will look at testing and wiring and cabling.

A Power Calculator



E = VOLTS
I = AMPERES (CURRENT)
R = RESISTANCE
W = WATTS (POWER)

Note:
DC only — do not use for AC applications

Drawn and supplied by Jim Gray

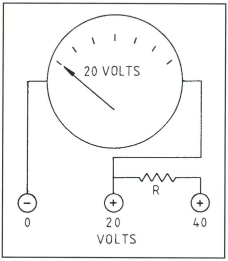


Figure 6

Hot Tip

Here is an idea for the *Sparks 'n' Arcs* column. For improving performance of any electric motor with permanent magnet stators, i.e. Mabuchi 540-550, simply wrap around the motor case one row with 1-1.5mm (3/64 - 3/16") non isolated copper wire and solder each end to the motor case — you actually improve the magnetic flux. You must wrap the wire very neat and as tight as possible and the wire must be straight with no kinks or sharp bends.

Levent Suberk
Turkey

Remember —
Sparks 'n' Arcs is **your** column.
If you have an electrical project or any useful tips, send them in to AME.
Need **help** with an electrical issue? Send in your query and maybe we can help you.

An Atkinson "Cycle" Engine

Story and photos by Ernest Betteridge

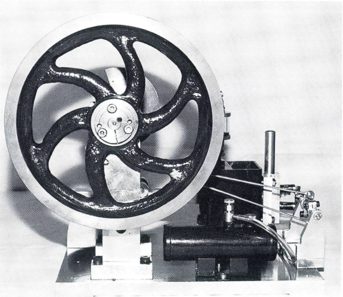
I recently completed a working model of an Atkinson "Cycle" Engine (**see photos**) which was constructed generally, in accordance with the design of Jim Lewis as detailed in the book *Building The Atkinson "Cycle" Engine* by Vincent Gingery.

The prototype

James Atkinson was born near Manchester, England in 1846 and grew up to serve his apprenticeship with a marine engineering company. Initially, because of his trade, his interests were mainly in steam engines and ships, but in 1879 he showed a widening of these interests and in 1881 and 1882 he applied for patents for two-stroke Robson-type engines.

The dominant engine of the times was the Otto four-stroke which was carefully protected by patents which were jealously guarded. These patents involved not only the four-stroke cycle but engine compression as well. The challenge that faced Atkinson and other engineers of his time was to develop an engine which could compete with the Otto models and at the same time not infringe on his patents.

To meet this challenge, in 1886 Atkinson produced his "Cycle" engine, which was unusual in that it did not have a separate cam shaft or timing gears, yet was still able to complete all four strokes



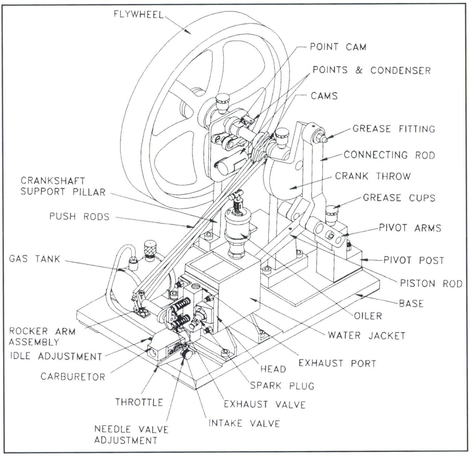
in one revolution of the crankshaft. The engine had a single piston with a longer and faster expansion on the power stroke. The result was that the "Cycle" engines used less fuel than the Otto models, became popular and were made in sizes up to 30 horsepower. They won widespread acclaim but it proved to be short lived, because in 1890 the Otto four-stroke patents expired allowing many manufacturers to break into what became a very competitive four-stroke market.

How it worked

Because of the unique two part linkage between the connecting rod and the crank throw, the piston was able to go through four complete strokes in one crankshaft revolution. The engine was water cooled and had a single piston that ran in a horizontal cylinder. The need for timing gears and separate cam shaft was eliminated by locating the cams on the crankshaft. The cams operated a pair of long, unusual push-rods. The push-rod action created by the cams operated the exhaust and intake valves located in the cylinder head. A spring-loaded flyball governor controlled the fuel valve and a hot tube igniter was used for combustion. The intake to expansion ratio was 0.56:1.

The model

My engine, as already mentioned, was constructed generally to Jim Lewis' design, although I did make some modifications to the valve operating mechanism and crank pin. These changes were for reasons of personal choice only and not because of any doubts as to the original design. The size of the model in the photographs can be visualised by noting that the flywheel diameter is 21cm.



Diagramatic Layout of the Atkinson "Cycle" Engine

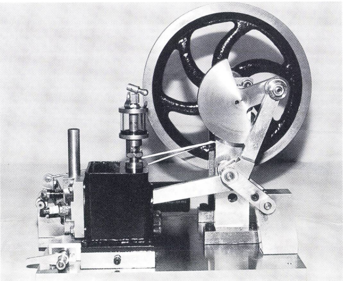
From *Building the Atkinson "Cycle" Engine* by Vincent R. Gingery

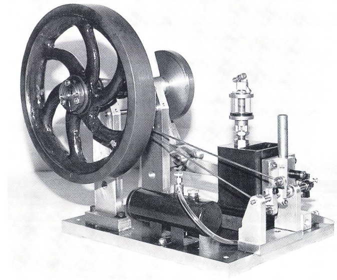
The initial startup was not completely successful — the engine would fire two or three times but not run. After rechecking ignition and valve timing, I discovered that the exhaust valve was closing too soon. This meant that there was exhaust gas still under pressure in the cylinder and when the inlet valve opened, gas was blown back through the carburettor. The exhaust valve cam was adjusted for correct closing and then the engine ran satisfactorily. I also experienced problems with ignition timing. Initially, the timing was set at TDC, and whilst the engine would run at a relatively high speed with a satisfactory response to the throttle and reasonable power output, the linkage sounded most unhappy. With this particular linkage system, I felt that a retarded spark would be necessary for quieter, smoother running. Setting the timing to slightly past TDC achieved the desired smooth and quiet running, but power was reduced considerably.

Observations

At one stage I tried using an Eveready® "Heavy Duty" battery for ignition. This battery was not a total success as it appeared unable to supply sufficient current for reliable operation (difficult starting, stalling and no throttle response). A "Super Heavy Duty" battery was a great improvement, overcoming all these problems.

This model runs quite satisfactorily as a demonstration engine but I don't think it will do very much work. This observation may be reviewed after more trials have been completed.





Auckland Soc. of Model Engineers 40th Birthday Exhibition

by Murray Lane

To celebrate the 40th anniversary of the formation of ASME club an exhibition was held over the weekend of the 30-31 of October. The decision to run this exhibition was only made 5 months earlier and was well organised by Bill Lovell and Bill Parker. Sadly Bill Lovell died a week after the completion of the event.

Just inside the entrance was a small display by the Palmerston North Model Engineering Club (**Photo 1**). This was manned by Paulette and Chris Morton and included a couple of small locos and several very interesting high accuracy measuring devices made by Bill Morris. One of these was used for producing a glass bubble, by bending a bar by a known amount inside the glass tube. Grinding paste is introduced inside the tube and then the tube is rolled backwards and forwards by pushing a flat plate across it. A side benefit is that the tube has a frosted appearance which makes it easier to see the bubble when in use. A graph was produced to show the accuracy of the curve in the tube.

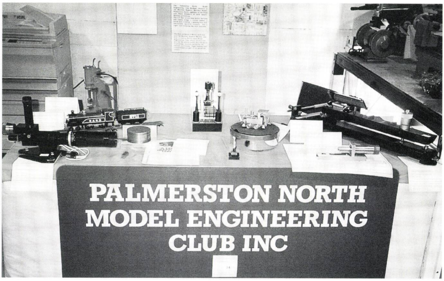


Photo 1

Another of Bill's items was a Face Geared Indexing Table as described in the *Model Engineer's Workshop* number 52 page 35.

Around the corner was the New Plymouth Model Engineers stand which included three traction engines. Monty and Mary George and Bernard Coyne were the club representatives.

New Plymouth was followed by the Rotorua Society of Model Engineers (**Photo 2**). Rex Toms was responsible for their stand, with Rex's modified and much travelled Simplex being the central item displayed with collection castings and patterns.

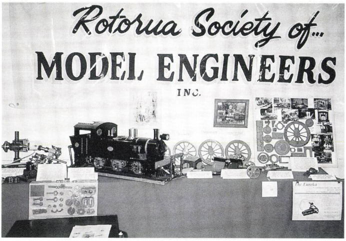


Photo 2

Most of the Manukau Live Steamers large display was taken up with the bigger 7$^{1}/_{4}$" locos, but there were several 5" engines . Jim McLean's Scottish version of Dave Giles *Phantom* was very well presented as seen in **photo 3**.

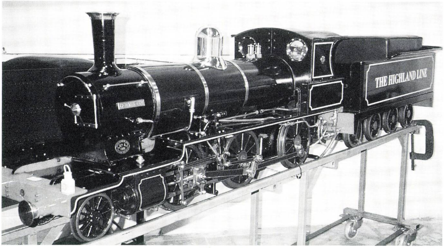


Photo 3

The movement of Dave Giles' large scale two truck Shay engine, ticking over very quietly on 10 psi of air, attracted a lot of attention from the public on both days. The very nicely made NZR 12000 gallon water tank in 7$^{1}/_{4}$" scale along side, was made by Ian McKay (and featured on the cover of the last issue of *AME*). Graham McCarthy's *Heidi* is on the left (**Photo 4**).

The Scale Marine Modellers had a 110 boats on display including Les Bryant's immaculately made *Bluebird of Chelsea*. This is a 1/13 scale model of a motor yacht made for Sir Malcolm Campbell in 1931 by Thornycroft (**Photo 5**). The large pool alongside was in continuous use with several hours each afternoon being set aside for the children to try their hands on the club's hire boats.

Aircraft were represented by the Auckland Model Aero Club, who tend to specialise in replicas of older models. They had a collection of these, these including several Wakefield designs. There was a large scale model of a Fockewulf Fw190 mounted on a rather precarious stand (**Photo 6**).

One of ASME's members, Fred Putt is encouraging youngsters to join a slot car club, and he had a track set up which was in use both days. Alongside was a tub with putt-putt boats running in it. The tub was in the shape of a shell and ingeniously deflected the boats onto a new direction when they hit the scalloped wall.

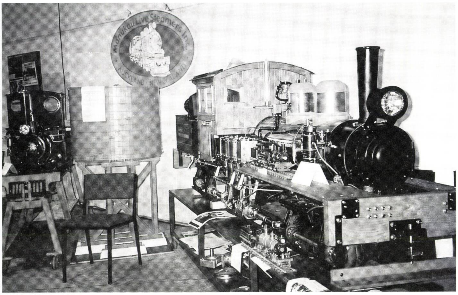


Photo 4

Graham Quayle, another ASME member had a display set up showing the range of small steam engines that he has developed from stock bar material, to help encourage new prospects into the world of model engineering. Plans, components and instructions are provided for these at much cheaper rates, than those available through the traditional source markets.

The Auckland Steam Engine Society stand included a very well made triple expansion launch engine made by Chris Cooper. Chris is now in the process of building a traditional 20 foot launch to fit the engine in.

Joan Clark the secretary of the Scale Marine Modellers is also a member of the Auckland Doll Makers Club and together with some of the other members put on a small display of dolls. Although this display was included for the ladies section of the public, these dolls attracted a lot of attention from most of the visitors. Joan gave a talk at a SMM club meeting recently, on the processes required in the construction of these dolls. There is a thirty percent shrinkage at the first firing of the ceramic figures. There appears to be as much skill and work required in the making of these dolls, as there is in making boats.

The Auckland Society of Model Engineers, the exhibition host club had an impressive display of members models, workshop machinery and clocks. Unfortunately the lack of room saw a number of items being taken away as there was not enough room to display them. Outstanding amongst the items was Alan Gasteen's 5" modified *Royal Scot* in gleaming brass. This engine is very detailed and it will be great to see it when it is fully completed. Mention must also be made of Alan Roberts' display of 9 aircraft engines, which included a pulse jet, a pure jet, a Wankel rotary, and two first world war rotary engines.

Many of the stationary engines and Stan Locke's *Maid of Kent* locomotive chassis were running on air. Viewers are always attracted to some thing which moves and it is well worth the trouble to have at least a part of any exhibition like this running on air.

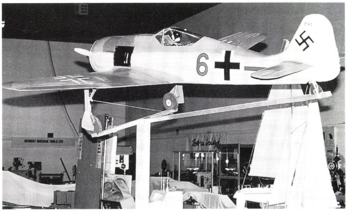


Photo 6

Members also gave turning demonstrations on Bill Lovell's Emco lathe, which created a lot of interest with the public.

There were two large electric railway layouts. The first by the 19 mm gauge club. The NZR locomotives displayed were scratch built by the members. The novel and only fund raising method used by this club, is selling cans of beer to members at a dollar more than the buying price.

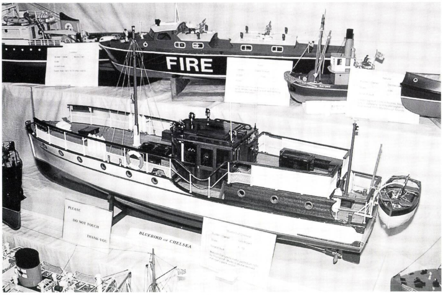


Photo 5

The other layout was built by the North Shore Model Railway Club and depicted typical New Zealand scenery and buildings, and of course the rolling stock in HO gauge. This display was very impressive in details, and was most realistic in appearance.

There were several trade stands, and McDonald Machinery sold a lot of aerospray cans of tapping fluid at bargain basement prices. As these displays were orientated around the home workshop, they created a lot of interest and a number of machines were sold over the two days of the exhibition. Of particular interest was the new type of linear display units, where the display is similar to the digital calipers. If the units can be mounted so that they are mechanically protected and the display unit is visible, they are a much better option for model engineers, than the traditional expensive machine digital units.

A couple of senior students from James Cook High School demonstrated a small CNC lathe, producing scale models of Auckland's Sky Tower from aluminium bar.

A dinner at the Logan Park Centre was enjoyed by 115 participants wives and friends during which Guy Hocking, Phil Isaac and Dave Watts were presented with certificates as the only remaining original founder members of the club from 1961.

All in all a well planned and run exhibition, it is just a pity that more people did not see it.

Memories of my Early Steam Days

by Clem Clemesha

Whilst I was looking through a family photo album I was reminded of my excitement at seeing and riding on the strange traction engine which is shown in the photos. I thought that other *AME* readers might be interested in a description of this monster.

This engine is one of two steam traction engines bought from the West Australian Government in about 1916 by my father Mr Chapman Clemesha, Mr Douglas Banks and Mr Sam Stone of Kebarringup and Borden districts in Western Australia. The engine was used for clearing their properties of timber by knocking it down and rolling it ready for burning. One of these engines is standing in a public area in the main street of Gnowangerup WA (the nearest town to our farm) at present but missing lots of parts I might add, including the pedrails.

The main difference between this engine and any other traction engine is the unique way in which it lays a track for itself. The two large rear wheels which are over 7ft in diameter lay tracks which are prefabricated structures of steel about five foot long with several cleats across the face of each to prevent slipping. These structures are known as pedrails and there are six pedrails on each wheel being divided by a heavy piece of steel encircling the wheel. This means that as the engine moves along, it is laying two tracks for each wheel. Each pedrail in turn falls to the ground allowing the wheels to move over them, then pulling them back on to the wheel by means of wire ropes.

This procedure is very suitable for moving over fallen timber. The pedrails can be clearly seen in photo 3.

On the front of the engine are two brackets and steel rings just below the funnel holding a wooden pole about the size of a telegraph pole but about twelve foot long. The purpose of this is to clear a path for the engine by knocking down everything in front of it.

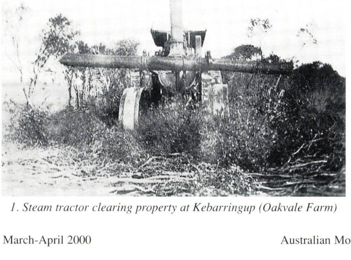
Behind the traction engine, drawn by means of long wire ropes, is a girder. A contraption with four large wheels, two front ones being as large as the rear tractor wheels and the rear wheels of the girder are much smaller. The girder is made up of a long twenty-two foot pole supported on four triangle shaped structures of very solid timber embodying the four wheels. The girder being nearly twice as long as the pole in front of the engine makes it quite a proposition for clearing timber.

The draught from the draw bar of the engine is through wire ropes, fastened to near each end of the top pole of the girder and the other drawing near the axle of each front wheel.

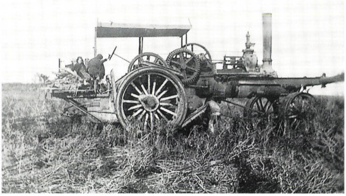
Behind the girder is a twenty-two foot by four foot steel roller attached by wire ropes.

The purpose of the girder is to drag the timber down and the roller to flatten it ready for burning.

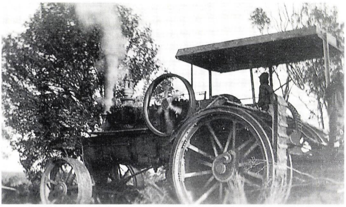
The girder being so high would drag quite big trees down but



1. Steam tractor clearing property at Kebarringup (Oakvale Farm)

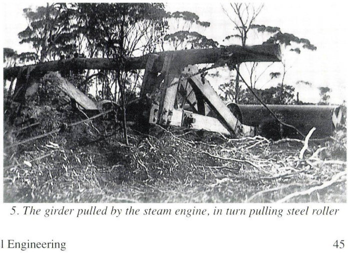


2. Side view of steam tractor on Clemesha or Banks property c. 1917



3. This view of the steam tractor clearly shows the pedrails.

4. Boiler water being supplied to the traction engine



5. The girder pulled by the steam engine, in turn pulling steel roller some times a tree being too large would have to be nicked with an axe. One day my father moved back from the engine to nick a tree in front of the girder but before he could get out of the half fallen timber his partner started the engine almost pulling my father down with the timber. The driver had a glass eye and couldn't see properly. I was sitting on the tractor but was very young and too dumfounded to call a warning. The driver eventually saw my father's plight and stopped just in time.

There is room in the cab for a couple of men as well as a stack of timber for the fire box. As you can see in photo 4, the water for the engine was delivered in a couple of tanks by a horse and dray.

6. View of steel roller looking opposite direction to previous photo

Club Roundup

compiled by Neil Graham

Adelaide SA

The club hosted the SA Inter Club run day last September, with SASMEE and Port Augusta well represented. One eye catching locomotive present was the QR 4-6-4 tank loco of Dave Worrell from SASMEE.

Several members ventured to Port Augusta for their October long weekend run. One train which was spectacular indeed, was a very long consist doubled headed with Peter Hoye's K-27 and John Wakefield's SAR 16F. Allan Wallace's dynamometer car was attached and it revealed the combined locos output was over 2 HP at the drawbar.

The now traditional show of work followed the November meeting and it attracted one of the largest turnout of club members for some time. Some of the items of note were Maurie Turner's Whimshurst Electrostatic Generator which kept punching holes in paper for the whole evening and a surprise display was Enrico Greco's *Climax* chassis. This is being built up from the Kozo Hiraoka design, but scaled up from 3½" to 5" gauge. Bob Yule's plate bender drew attention as did Bob Nash's petrol engine which he built when still a teenager and won a prize for his efforts. An increasing number of freight cars and vans shows they are becoming popular as construction items.

Adelaide Miniature Steam Railway Society Inc.
Location: *370 Regency Road, Prospect*
Public Running: *4th Sunday*

Auckland NZ

Auckland Society of Model Engineers

The Auckland club's 40th Anniversary Exhibition at the Ellerslie showgrounds was deemed a success with over 2500 people coming through the doors on the weekend (*see page 44 for full report*). Several other North Island clubs participated with exhibits to help make the exhibition the success it was.

At a recent Bits and Pieces night, there was an interesting discussion about various schools offering night classes for model engineers. One local high school tutor assisting a member with construction and use of the equipment.

Scale Marine Modellers

SMM participated in the ASME exhibition and had a very large display, with 110 ships and boats on display. There was also a pond with many boats being sailed.

ASME Inc. and SMM
Location: *Shared facilities at Petersen Rd Reserve, Waipuna Rd, Panmure*
Public Running: *Every Sunday*

Balcatta WA

The society will soon be offering training sessions for its members to gain accreditation for the safe operation of the railway. Work has been completed and paint on the access ramp to the centre of the track. A water bore has been installed on the site to ensure a reliable water supply for the summer months.

Last October 31st, the first advertised public run was held at the track site. Advertised as a Halloween theme, lots children and adults came along, many in fancy dress.

Four locomotives were in steam during the day. Lindsay Adams WAGR A class and David Naeser's SAR (South African) 4-6-4 were two of the more prominent seen in action.

The society participated in the Bassendean Fete in early November. The circular portable track was set up the day before and Lindsay's *Waratah* provided the power for the day.

Northern Districts Model Engineering Society
Location: *Vasto Place, Balcatta*
Public Running: *Last Sunday each month*

Berry NSW

The club was invited to participate in the AMRA model railway exhibition last October. Hugh O'Dempsey's now famous Rail Truck (*see AME Issue 82 ... ed.*) and a new railbus were displayed.

The club's annual Invitation Run on 9/10 October was well attended, with visitors from as far as Victoria attending. Diesels were outnumbered by steam by a large margin. Things were so busy at one stage there was a queue for the steaming bays! Of note was the performance of the club's D-57, which continues to improve with each outing.

Berry Railway Inc.
Location: *B35 Princes Highway, Berry*
Public Running: *None*

Bulla Vic

The official opening for the new track is planned for March. Commencing on the night of Friday 22nd and continuing on the 23rd and 24th. A sub committee has been formed to organise the event *(see p. 51)*

Tullamarine Live Steam Society
Location: *15 Green Street, Bulla*
Public Running: *1st & 3rd Sundays*

Burnaby BC

The end of October Pumpkin Run was a success, despite the weather's best efforts to spoil it on the Saturday; Sunday was much better. Over 550 rides on Saturday evening and just over half that many on the Sunday topped off a successful weekend.

The Lougheed Mall Santa Express trains were run again with the portable track from late November till the end of December. At the time of writing, takings were running 20% ahead of last year This will certainly boost the finances and put us back into the comfort zone.

The executive have recognised Steve Postlethwaite and Walter Pruden as the

Men of the Year due to the huge contribution they made to the club in the past year.

British Columbia Soc. of Model Engineers
Location: *Rainbow Creek Station, 120 Nth Willingdon Ave, Burnaby BC Canada*
Public Running *Saturday, Sunday & public holidays, Easter through to 2nd weekend October.*

Cobden Vic

The Cobden club was one of the many community organisations active and contributed to Cobden being named Victoria's Tidiest Town, with the development of the Cobden miniature railway receiving wide acclaim!

It was reported that the Boaties who came along and sailed during the Festival Weekend enjoyed themselves so much they have vowed to return.

Honorary Life membership has been bestowed on John Wiggins and John Riches for their contribution to the club since foundation.

The new Bailey Bridge has been finished, complete with brick ramparts. Constructed with mainly re-cycled material, it has given the club a valuable asset and helped clean up a lot of the excess materials from around Railway Park. Work continues on ground and track maintenance, with pointwork being strengthened to help cope with the high axle loads.

A recently installed signal light is proving a boon to drivers when negotiating the blind Denneys Bridge curve.

South Western Model Engineers Inc.
Location: *Grayland St, Cobden*
Public Running*: 3rd Sunday*

Galston NSW

The October Anniversary weekend was significant this year for two reasons. First was it a bit of a celebration for the ownership of our land. All debentures repaid and the Certificate of Title document has been handed over to the club. Secondly, a scale trains timetable run was tried for the first time as part of the Saturday inter-club day. Although there were some hiccups, the interest shown and the popularity of such an event was apparent. The popularity of the Saturday Inter Club day exceeded the capacity of the facilities. The scale trains timetable runs will be transferred to separate days. A committee has been formed to organise these runs on a more regular basis. The first is hoped to be in March, with possibly a second in August.

The Ronaldson & Tippett I.C. engine is going to be moved to the museum at Fagan Park, where it can be run regularly under the care of our members.

Many sections of the main line have passed their use by date and the board has been looking at proposals for replacement. While there was initially little support shown for the $3^1/_2$" gauge track, the track committee has determined and recommended that the $3^1/_2$" will be retained for the inner loop and main line at this time, but that no new $3^1/_2$" track to be laid.

Several members availed themselves to assist the Mudgee club as part of the Mudgee Wine festival. Five locos and a goods train were represented. All concerned reportedly enjoyed themselves. 29 members (and 13 locomotives) made the pilgrimage to Wagga and Phil Gant received the Achievement Award for his recently completed locomotive 1201.

On site, new halogen lights have been installed over the steaming bay and the new wiring to the signal at the entry of the cutting is complete. A new wood fired barbeque has been constructed and installed in front of the clubrooms. It has passed its first run with flying colours. Level crossing signs cast in aluminium and powder coated with black letters have been placed around the track at ten different locations.

Hornsby Model Engineers Co-op Ltd
Location: *29 Mid Dural Road, Galston*
Public Running: *2nd Sunday*

Hobart Tas

Past and present members of the Hobart Miniature Live Steam Locomotive Society, their families and friends gathered on Saturday 27 November to celebrate the 25th Anniversary of the Society.

Foundation members Ian Simpson, Stan Rowe and Bob Morrison joined President David Crisp in a celebration cake cutting. Live steaming, static displays of models and a barbeque ensured an enjoyable day for all, which was recorded for future generations of modellers by the attendance of the local TV and print media.

Hobart Miniature Live Steam Locomotive Society Inc
Location: *Flagstaff Gully Road, Lindisfarne*
Public Running: *None*

Horsham Vic

We have had a few changes in Horsham over the past year or so with a relocation of our track from Golf Course Road to Sawyer Park on the corner of Firebrace and Hocking Streets, Horsham. We have had good backing from Horsham Rural City Council with a suitable site close to the Wimmera River with the Horsham Caravan Park across the road.

Wimmera Live Steam & Model Engineering Society Inc
Location: *cnr. Hocking & Firebrace Streets, Horsham*
Public Running: *Second Sunday*

Luddenham NSW

Harold Campbell and Tony Peacock were awarded life memberships for their contributions over the years.

New fences are being installed on the property. The Anniversary weekend was well attended by both members and the public. Over the Christmas break, work is being done to complete the platform renovation.

Running and work days have now been separated which is hoped will encourage better participation.

Sydney Society of Model Engineers
Location: *R53 Luddenham Road, St Marys*
Public Running: *Last Sunday each month*

Maidstone NZ

The club has started the running season well with attendance at a satisfactory level. The club recently got news that the council is allocating a substantial amount for the re-development of Maidstone Park over several years. This is seen as being a positive for the club with plans already underway to link the ground level railway in with the playground development.

The club has been officially thanked for the participation in the Sport & Leisure Expo last October

Maidstone Model Engineering Society Inc.
Location: *Maidstone Park, Upper Hutt*
Public Running: *Every sunday afternoon October-April*

Mangere NZ

With the onset of spring, two working groups set to and made the necessary ongoing repairs to keep the railway running. One group made repairs to the track caused by soft ground over winter. The middle of the reverse curve leading to the tunnel had a wrong way roll causing trolleys to de-rail. The second crew had the thankless task of painting the gear container.

The Manukau club was well represented at the Auckland Exhibition. It was a great publicity exercise for the club, the centrepiece being Dave Giles' Shay running on air all weekend.

The trialing of two way radios on long trains has been successful and the club has approved the purchase of five sets.

Bits and pieces still proves to be interesting with items ranging from expansion link milling jigs to wheels. Dave Giles showed a new bogie he has designed and built for his ride cars. They are fully equalised and have double bearings in each wheel which reduces flange chafing on curves to almost nil. As an aside, tests at MLS over the last ten years have shown that bogies with double bearings in each wheel require only half the power to haul them around curves compared to traditional fixed wheel/axle sets running in axleboxes.

Manukau Live Steamers Inc.
Location: *Mangere Centre Park, Robertson Road, Mangere*
Public Running: *Every Sunday*

Maryborough Qld

In the last few months, the club has attracted six new members. The Spring

Festival was, as always, the club's big event for the year. Where else could you see triple 38s running and an AD60 (incomplete) taking up most of a siding. For this years competition there were nine locomotives present. A half size Rosebery hit and miss engine was also there and it ran sweetly. The Kuskie Award and Locomotion trophy was presented to Bob Kimber for his completed LNER V2. The Under 25s awarded to Bruce Hielscher for his double acting pump and the progress award was presented to Jim Bryan for work on his *Claud Hamilton*.

MELSA Maryborough
Location: *Queens Park, Maryborough*
Public Running: *Last Sunday*

Millswood SA

The $7^1/_4$" gauge tunnel has been lengthened some 8 feet towards the canteen and a red brick portal added. A concrete roof was poured incorporating a curved top which will aid drainage. A level crossing for pedestrians is being constructed a short distance from SASMEE Park station. Flashing lights and gongs based on full size are being manufuactured.

A new poly tank for the loco water supply has been installed next to the workshop. Two locomotives have recently joined the roster, one x 5" and a $7^1/_4$" gauge loco based on the WAGR B class 2-6-0.

South Australian Society of Model & Exp. Engineers
Location: *off Millswood Crescent, Millswood*
Public Running: *1st Sunday & 3rd Saturday*

Moorabbin Vic

The club workshop continues to grow. The surface grinder is now operational and the club has recently acquired a universal milling machine. It will make a good companion to the large lathe and will enable members to do those larger jobs which cannot be managed in the average home workshop.

The new elevated station is coming to fruition and will be a source of great pride to those who are building it.

The signalling system has undergone a major transformation over the last year or so and the new system should serve the club for many years to come when the project is finished. Manufacture of the manual/air operated point levers continues at a home workshop and the new departure signal controlled by the Stationmaster on the ground level track has proven its worth.

The renovation and re-building of the elevated track continues, with major work being done but still keeping the track in operational condition.

The gauge one project continues to power along with great enthusiasm coming from the devotees. The brickwork for the dogbone is nearly complete and the tracklaying will commence soon. Several locos have been completed by members with others in the course of construction.

Member Dave Smith has converted his QR A-10 into a B-10 (2-6-0) and has conducted trials. He reports that the loco is now much steadier on its feet and the hauling capacity has markedly increased.

Club running days are also well attended, with the November run being especially so with the Marcus Traylen Trophy being won and presented to Darin O'Brien for his 5" Fowler 0-6-2.

Steam Locomotive Society of Victoria
Location: *128 Rowans Road, Moorabbin*
Public Running: *1st Sunday*

Morphett Vale SA

During November and December the Per Way Dept. undertook two major projects — the removal of all ladder type constructed track (about 90 metres) and the removal of about 150m of the original 'T' section track in the Loop line. The ladder track has been sold off and the 'T' section rail has been reversed due to flange wear, and the rail ends were cropped as they were badly bruised and bent, and the old type fishplate would not hold them true.

A 54m section of 'ladder' track on the Loop line was removed and replaced with continuous welded 'T' section (using plastic sleepers) to a constant gradient using a laser level (purchased by the club). After the track was removed a front end loader was hired to remove the old road bed, achieving in 8 hours what would have taken about 5 months.

Secretary John Wakefield has purchased an aluminium gondola type truck with cross seating and fitted with MVR new type air braked Arch Bar bogies. This truck is under trial with a view to replacing the old 'A' frame non braked trucks.

The GM12 has had the main generator re-built and the loco is now running well. The other club loco, *Southern Pacific* has been re-classified as a U33-C and the wheels have been re-profiled. Also a small generator has been fitted. Reports have it that well known live steamer and member John Wakefield has come into "custodianship" of an Amtrak F-40PH diesel loco. While he denies all knowledge of ownership, he and another member have been putting a lot of time into the loco, bringing it up to club standard with repairs to the bogies' suspension and the addition of air brakes and lighting. Bob Nash's new Southern (Ps4?) 4-6-2 has had its first paying run at the MVR.

Per Way and signalling work continues apace, with repairs and relaying of 18m of loop line to facilitate work to the main line which is expected to take 5-6 months. Speed restriction boards have been placed in the deviation area.

Morphett Vale Railway Inc.
Location: *Wilfred Taylor Reserve, Wheatsheaf Road, Morphett Vale*
Public Running: *2nd & 4th Sundays*

Moss Vale NSW

A new point has been constructed and is used with the portable track. It is now much easier and quicker to have locomotive changeovers with only minimal disruption to passenger trains. The main Christmas party booking was successfully run in November. Two locomotives were rostered, the *Royal Scot* steamer ran the first half and the 422 class diesel completed the day. Both locos handled the three car plus van load reliably and without incident

Southern Highlands Model Engineers Inc.
Contact: *(02) 4868 2404*
Public Running: *Booked runs only*

Narrabeen NSW

Ten members and their families attended the Canberra model boat regatta in November. The 1st November running day was well attended. However, the 2nd November run day was marred by poor weather and so an early call off was taken.

At the November meeting Show and Tell, Malcolm Murray showed and demonstrated his new Kitchener rudder and also showed a new tiny servo operated speed controller connected to a Robbe 385 motor. These are destined for a tug.

Maritime Model Club of NSW Inc.
Contact: *PO Box 1731, Dee Why 2099*
Location: *Wakehurst Parkway, (opp. Academy of Sport) Narrabeen*
Sailing Days: *1st & 3rd Sundays of the month*

Nelson NZ

The club house is looking good these days with most of the painting and varnishing now completed. When finished the next project will be the floor coverings.

A grant has been received from the Nelson City Council which will be used to improve the area to the north side of the clubhouse.

Dick Carter was recently made a Life Member and he has also been awarded the Evans Trophy in appreciation for all the work he has done around the club over many years.

Nelson Society of Modellers Inc.
Location: *Adjacent Tahuanui Beach, Walkare St, Tahuanui*
Public Running: *Every Sunday afternoon*

Newcastle NSW

With the completion of Terry Bartle's *Blowfly*, the club members have nine completed and there are three under construction. It is thought that there will soon be need for a can of Mortein to be kept in the steaming bays.

Several months ago, member Bob Purcival arrived at the track with what appeared to be a pile of auto junk. However, the "tut-tutting" sceptics soon ate their words as the thing was immediately set to work shifting sand, gravel and landfill and soon proved its usefulness.

The Moon Buggy, (as it was soon christened) has been steadily modified and improved and the original motor (which had more knocks than an Avon lady) has been replaced.

The four booked days in November had mixed weather, and the number of passengers carried reflected the same.

Clearing work along Cocked Hat Creek has kept a few members busy, but the effort has been worth it as what was an eyesore has all been cleaned up including the removal of dead trees from the creek and so should be easier to keep tidy.

Lake Macquarie Live Steam Locomotive Society Ltd

Location: *Off Velinda Street, Edgeworth*

Public Running: *Last Sunday (except Dec.)*

New Plymouth NZ

The Labour Weekend in October was brilliant. The were visitors from nine North Island clubs. However, some of the track showed its age and one of the concrete supports had to be repaired later. Permanent repairs are on the agenda. The track repair team has been busy of late with re-gauging the track from the turntable to the bridge. There is still plenty more to be done. The trolleys have had further maintenance done on them as some of the wheel bearings needed replacing.

Running days well attended, the Dsa, *Springbok* and club loco doing most of the hauling.

The New Plymouth club was represented at the Auckland Exhibition and many members loaned models for the display. Geoff Armistead and Monty George manned the stand.

New Plymouth Society of Model Engineers

Location: *Cnr Liardet and Gilbert Sts, New Plymouth*

Public Running: *Every Sunday*

Petone NZ

The committee has decided that the clubhouse needs to be painted. One of the operating trolleys has been re-furbished and the "splittable" six foot trolley is getting a two foot extension.

Hutt Valley Model Engineering Society Inc.

Location: *Marine Parade, Petone*

Public Running: *Every fine Sunday*

Perth WA

A grant to complete Stanbridge has come through and now all that is needed is approval from the Canning council. A new coal bin has been installed and when fitted out should be an asset to the club, making loading and storing of coal easier.

Castledare Miniature Railways of WA Inc.

Location: *Castledare Place, Wilson*

Public Running: *1st Sunday*

Tamworth NSW

After the disappointment of losing the previously agreed to site for construction of our railway, a new site has been found at Kootingal and it is now being evaluated.

Discussions have been held with the view to construct a portable track for members use and maybe public running.

Tamworth & District Model Engineers

Location: *Contact John Buckley (02) 6765 3783*

Meetings: *Second Saturday*

Tauranga NZ

The Tuesday club have completed the safety fence and the traverser gate system, which will increase safety during passenger operations.

Approval has been given and a budget set to construct six more ride cars. While the gondola type car would appear safer with respect to dragging feet, the "on trial" gondola did not meet the unqualified support of members. The observation was made that the gondola seemed quite difficult to use for older people. The committee has tentatively recommended a non gondola type, but considerable details need to be finalised.

Reports continue that all tunnels are exhibiting a tendency to sink into the ooze, the main tunnel about 60mm since construction.

Tauranga Model Marine and Engineering Club

Location: *Memorial Park, Tauranga*

Public Running: *Every Sunday*

Warner Qld

The recent Trophy Day 99 was the day when members showed their efforts for the past 12 months. Brilliant weather and a good crowd ensured its success.13 locomotives were displayed and 11 other model engineering items were displayed. The Championship cup went to Noel Eberhardt for his 5" Shay. Best Unfinished prize went to Dick McKenna for his 7¼" QR A10 (No.3). The Engineering prize was won by Don Hinchliffe for work on his 5" DH loco. Horology winner went to Merv Henderson for his Skeleton Clock. Myford Encouragement to Owen Coster's Pin Drill and finally the Australian Prototype Award to Dennis Tregea for his cane truck.

The club has attracted 5 new members and 11 provisionals have gained full membership. The society recently received a cash benefit which has been earmarked for the ground traverser. Concrete support pads have been laid on the roadway to the signal cabin. They are for the ground and elevated unloader.

Qld Society of Model & Experimental Engineers Inc.

Location: *Lot 5 Warner Road, Warner*

Public Running: *None*

Wandong Vic

Wandong Live Steamers have a new secretary and contact address — David Sutherland, 19 Bouvardia Cres., Frankston Vic 3200.

Wandong Live Steamers Inc

Location: *Mathieson's Siding, The Dene, Wandong*

Public Running: *???*

West Ryde NSW

In August the main entrance was used for the first time after the completion of the council drainage works. The run day was well served by six engines for the elevated. With all these locomotives in operation, the ground lever frame had plenty of use with the crossover as well as points being used. The ground level was well served on the inner and outer mainlines by the "high wheelers" with *Bitza* double heading with Graeme Kirby's pacific completing the roster. Over 2500 rides taken.

Junior members Andrew Allison and Scott Murray kept themselves busy with track upgrading on the ballast siding. This siding is now just about in mainline condition!

October saw a triple header of 3142, 3506 and 5037 work the outer main later in the afternoon. Mike Tyson's 5112 ran a works train for a while and John Tulloch's H class was on shed. October was also the 50th Anniversary of the grounds opening and many locos which had not been seen for some time appeared including 2 x 2½" gauge *Princesses* in the elevated roundhouse. The Cec Mackellar built Atlantic was on loan for the occasion.

The club members have been asked to "please consider" the idea of something special for the runday/weekend which is the next day after the Olympics opening.

The club has revised its braking policy in the light of the new "onus on the clubs" AALS requirements. Elevated trains to have 33% minimum of cars braked, ground level to have 66% ground level cars braked.

Sydney Live Steam Locomotive Society

Location: *Anthony Road, West Ryde*

Public Running: *3rd Saturday afternoon*

Wodonga Vic

We had a very busy Christmas season with four private parties booked and two club parties plus our normal running day, followed by the club Christmas party at Ken and Gale McPherson's house. We welcomed in the New Year with a party in mid January for current and former club members at the home of Allan and Claire

What has your club been up to?

We all like to keep in touch!

Send a brief note to tell us!

Or post a copy of your **newsletter** — but make sure you use a highlighter pen to show the item you would like us to publicize. Remember to concentrate on news that appeals to AME's wide range of readers.

Douglas.

Plans for our invitation run in May are going well. Once again, we will be holding an all night run following a spit roast dinner on Saturday night. We look forward to catching up with old friends and meeting new ones.

The plans for our ticket box are in the hands of Council. Hopefully, the building will be finished in the near future. We can then begin building our signal box and track extensions.

Lake Hume Model Engineers Inc
Location: *Lincoln Causeway, (Hume H'way), Wodonga*
Public Running: *3rd Sunday*

Wollongong NSW

The September run day coincided with football grand final and this affected the passenger numbers somewhat. October was a washout but November was an excellent day with a large crowd and the trains were kept busy all day.

The club has successfully secured a new 10 year lease for the ground.

The new coal bin has been completed and all it needs now is a coat of paint and relocation. Track maintenance continues and the north box electrics repairs are still in progress, with five electric point motors receiving the once over to restore their reliability.

Illawarra Live Steamers Co-oP Ltd
Location: *Stuart Park, Virginia St, North Wollongong*
Public Running: *4th Sunday*

Farewell

We say goodbye and thankyou to these model engineers who have passed on:

Jack Mockett (Hornsby ME)
Barry Foreman (Hornsby ME)
Bill Lovell (Auckland SME)
Noel Hayward (BHPWestern Port RS)

and extend our condolences and best wishes to the family and friends they leave behind.

Coming Events

3 to 5 March
Official Opening Bulla Hill Railway — Bulla Vic

The Tullamarine Live Steam Society invite you to attend the Official Opening of their new track on the first weekend in March. This in an ocasion not to be missed. See the next page for full details.

11 to 13 March
Corroboree 2000 — Eltham Vic

Come and help the Diamond Valley Railway celebrate 40 years since the turning of the first sod. The schedule is Friday — opens 4:00pm with running till 7:30pm, Saturday —fun run, no public 9:00am till 8:00pm, Sunday — normal public running 11:00am to 5:00pm, visitors may participate. All night running Sunday night into Monday. Monday fun run, (no public) till 5:00pm. (03) 9439 1493 email: dvr@nmit.vic.edu.au

21 to 24 April
AALS 44th Convention — Warner Qld

QSMEE are hosting the year 2000 Convention. It's not far away. Have you registered yet? For further info. contact Convention Secretary, Bob Campbell, PO Box 322, Everton Park 4053. Ph. (07) 3263 7462 (or Club Sec. Hugh Elsol (07) 3849 5573.

21 to 25 April
South Island Steam Expo – Nelson NZ

South Island Association of Model Engineers Clubs annual get-together. BBQ, evening running, steam trials, yacht/boat sailing, 00 table top layout, PLUS the official opening of the new clubhouse. Each day 9am till late. Trevor Brough (03) 548 6855

26 April
Post-Convention Run — Maryborough Qld

The members of MELSA invite you to a post-convention run at their track in picturesque Queens Park, Maryborough on the Wednesday immediately following the Convention. Maryborough is about 260k north of Brisbane and a comfortable 2$^{1}/_{2}$ hours drive from the Convention venue. Everyone welcome, but unfortunately we have no facilities for 7$^{1}/_{4}$" gauge locos other than great hospitality. Contact Secretary, Graham Chadbone (07) 4121 4341.

28 April to 1 May
Annual May Day Run — Mackay Qld

The Mackay Society of Model Engineers' annual May Day run is on the weekend following the AALS Convention in Brisbane and you are invited to come further north to join us. Members will be in attendance from midday Friday so you can have a play in the afternoon. The usual format is Friday night run and casual BBQ, Saturday all day running and organised dinner at RSL at 7pm, Sunday all day running followed by BBQ at club. Track available on Monday if anyone wishes to run. 5" gauge facilities only. The club will be holding a school holiday run on Wed 26th, anyone passing through is welcome to join in. For further information re weekend, accommodation, etc. contact Secretary, Len Heaton, PO Box 5267, Mackay Mail Centre 4741. Ph. Len (07) 4959 2169 or Bob (07) 4959 7152.

6 to 7 May
11th Annual Steam Fest — Wonga Beach, North Queensland

The annual Pinnacle Village 5" gauge Steam Fest is on again. As it is the weekend after the Mackay run, why not head further north to Pinnacle Village, Vixies Road, Wonga Beach. Discount on-site accommodation available, also camping and powered sites. Coal supplied and workshop facilities available. Ph (07) 4098 7566 or email pinnvill@internetnorth.com.au

13 to 14 May
Kindred Society Day — Moorabbin Vic

The Steam Locomotive Soc. of Victoria will again be staging this popular weekend with the theme this time of Scale Rolling Stock, running or display. If you have some, bring it! If not, make some and bring it! 2$^{1}/_{2}$", 3$^{1}/_{2}$" and 5" track gauges and hopefully the Gauge 1 track will also be running by then!

20 to 21 May
LHME Invitation Run — Wodonga Vic

Lake Hume Model Engineers invite you to Wodonga Creek Miniature Railway for their 2nd annual Interclub run. Come and play early till late on Saturday and join us in a spit roast dinner. Stay and play on Sunday or join in our public run 11am to 4pm. For more information, contact club sec. Kathy Skidmore on (03) 5862 3774, by email at lhme@cnl.com.au or check out the club homepage www.cnl.com.au./users/lhme.

20 to 21 May
Interclub Run — Fairfield NSW

The Western Districts Live Steamers will be hosting the May interclub run at their track located on the western side of the Fairfield Showground complex, Smithfield Road, Fairfield. (If the main gates are closed, there is a rear entrance off Moonlight Avenue on the western side of the Showground. 200m of elevated 2$^{1}/_{2}$, 3$^{1}/_{2}$ and 5" track and 500m 5 and 7$^{1}/_{4}$" gauge ground level, which is welded to steel sleepers mounted on wood sleepers and floating on a concrete base. Steaming bays have 12volts and compressed air. Open Fri, Sat and Sun for visitors. On Saturday there is a market in the Showground along with public running as they are a regular clientele. This requires one train only so will not interfere with the interclub run. Sunday is our normal club day. Peter Martin (02) 9644 6559 or 0419 492 558, Graham Butler (02) 9522 7797 or Jack Keogh (02) 9823 9652

21 May
Steam Rally and Tractor Pull — Gisborne Vic

The Gisborne Vintage Machinery Society is holding its annual rally at the Gisborne Steam Park (Melways 197 F4). A vintage tractor pull will be conducted, open to all tractors manufactured up to 1955. Also featuring will be the club's Perry loco in steam, steam portable and traction engines and oil engines. The club miniature railway will be operating, providing rides for kids of all ages, with other entertainment available for the kids, along with a variety of other interesting exhibits. Contact Noel Smithwick for details (03) 5429 6316.

24 June
Birthday Run — Bracken Ridge Qld

Come and help the Bracken Ridge Central Railway celebrate its birthday. Prizes will be presented to the best QR loco and the best presented loco overall. 5" gauge steam only. Food and drinks supplied to operators and char for locos. Steam up from 7am, public rides 10am to 4pm, with presentations about 1pm. Model engineers are invited to bring and display their work. Please phone Neil Mackenzie (07) 3169 2042 or contact Ross (Goldie) Goldsmith at goldicom@bigfoot.com or 20 Talgai St, Bracken Ridge 4017.

15 to 16 July
International Model Steam Rally & Exhibition — Guildford, Surrey UK

Every four years the Guildford Model Engineering Society give their rally an international flavour attracting model engineers from around the world. Modellers are invited to attend from Sunday 9th July, camping facilities and local hotel accommodation within walking distance of the track. Programme of events during the week beginning July 9 includes a visit to a full size preserved railway and similar events. The week culminates in the Rally on 15th and 16th, 11am to 5pm each day. Model traction engines, steam boats, steam train rides, workshop demonstrations, over 30 trade stands, refreshments and lunches. Railways from 00 to $7^1/_4$' gauge. Stoke Park, London Road, Guildford (Junction of A25 and A3100). Contact John Jones, 282 Grange Road, Willow Park, Guildford, Surrey GU2 6QZ UK, Ph. 01483 233687 or email johnmyda@jejones.fsnet.co.uk

12 to 14 August
IBLS Meet of the Millennium — Burnaby, B.C. Canada

The British Columbia Soc. of Model Engineers are hosting this widely anticipated event. A tour from Australia is being organised. Contact Barry Glover 31 Spinks Road, Corrimal NSW 2518, Fax (02) 4283 2331

30 September to 1 October
Model Engineering Exhibition — Melbourne Vic

The Melbourne Society of Model & Experimental Engineers will again be holding their popular two yearly exhibition at Monash University, Clayton. With the aims of promoting model engineering in all of its forms and providing a venue for model engineers to come together, they expect a large number of clubs will participate as well as individual exhibitors. There are no exhibitors fees, the costs of organising the event to be met by entry fee and contributions from commercial exhibitors. The large modern well equipped display area is located in the engineering faculty at Monash University. Interested in participating? Contact MSMEE secretary on (03) 98897907 or email ian.stewart@sci.monash.edu.au

7 to 8 October
4th Old wares Expo — Warragul Vic

The West Gippsland Vehicle Restorers Club Inc are holding their 4th Old wares Expo at the Warragul Showgrounds. There will be displays of collectables, memorabilia, steam machines, household wares, historical photography, vintage vehicles, yesteryear fashion parade and much more. Contact Greig Wilson (03) 5623 1493

20 April to 6 May 2001
Australian Miniature Cane Locomotive Gathering — various

Come on a special tour for owners of model sugar cane locomotives starting from the Australian Narrow Gauge Railway Museum at Woodford, Qld and finishing in Wagga Wagga in southern NSW. Over 2 weeks visiting top $3^1/_2$", 5" and $7^1/_4$" tracks. There will be social activities and key industry figures will be attending. See below for full details.

10 to 14 January 2002
MODEX 2002 — Palmerston North NZ

The Palmerston North Model Engineering Club is hosting MODEX 2002, the NZ International Convention and Exhibition. More details will be published in later issues. Contact address is MODEX 2002 Registrations, 8 Wharite Place, Palmerston North, New Zealand. Ph. 64-6-355-700, Fax 64-6-355-7008 or email engineering@clear.net.nz

Tullamarine Live Steam Society

announce the Official Opening of

The Bulla Hill Railway

We know it's been a long time coming but the time has come to officially open our Bulla Hill railway. After three years of tireless work by the members of the TLSS, the Official Opening of our railway will take place on **Saturday 4th March 2000.**

It is to be a three-day event starting with our Members meeting at 8pm on the Friday night, to which all visitors are welcome.

Saturday will be an AALS affiliated clubs closed run day starting at 9am and going right through to a night run into the wee small hours. This will give our visitors a chance to run on the over 2km of 5"/$7^1/_4$' track. A sausage sizzle lunch will be available at a very small cost. Afternoon tea will be an official gathering in the community hall adjacent to our track with drinks and finger food provided by our council.

A spit roast dinner will be available to all visitors, again at minimal cost.

Sunday will be our normal Public Run Day starting at 12 noon and will receive wide publicity with free family passes available and the local radio station doing an outside broadcast. Visitors are invited to run during this time, either carrying passengers or just running around. Again a sausage sizzle will be available and running will end about 6pm.

Visitors are invited to camp in our grounds or sleep in our clubrooms, which has a kitchen, toilets and a shower. There is a hotel/motel 100 metres from the track with a very reasonable tariff.

We look forward to offering that Tulla hospitality that those who attended our conventions will remember.

Australian Miniature Cane Locomotive Gathering

Friday 20 April to Sunday 6 May, 2001

Interested in the Queensland sugar industry railways (tramways)? Do you own a model of a cane loco?

If the answers are **yes**, this is the event for you, a once only tour of some of the top tracks in the country including $3^1/_2$", 5" and $7^1/_4$" gauges. **This is the itinery**:

Fri 20	**ANGRMS, Woodford. Social, BBQ and steam train rides (2ft gauge)**
Sat 21	**QSMEE track at Warner. Trains from 7:30am to night running**
Sun 22	**QSMEE 7:30am to 5:00pm. Running trains**
Mon 23	**To Melaleuca Station, Chinderah (2ft gauge Perry) then to Repton (Coffs Harbour) 5" private track, afternoon/night run**
Tue 24	**Running at repton**
Wed 25	**Travel to LMLS at Lake Macquarie. Afternoon/night run. BBQ and social**
Thu 26	**Running at Lake Macquarie all three main gauges**
Fri 27	**Running Lake Macquarie**
Sat 28	**7:30am Gosford day/night run, includes an afternoon charity run**
Sun 29	**Travel to Galston 7:30am, run until evening, BBQ (no $7^1/_4$")**
Mon 30	**Rest day in Sydney**
Tue 1	**Loftus Tramway Museum, Peter Neve's and ILRMS Albion Park (2ft gauge ex sugar steam locos Cairns and Tully No.6 may be in steam**
Wed 2	**7:00am to 11:30 ILS Wollongong (no $7^1/_4$").** **1:00pm to sunset Berry ($7^1/_4$" only)**
Thu 3	**Travel to Wagga Wagga. Bus tour with locals. (Overnight security avail)**
Fri 4	**Wagga Wagga 7:30am to night running. Official civic welcome, media.**
Sat 5	**Day/night running. BBQ**
Sun 6	**Wagga Wagga club running day. Cane locos to haul trains. Industry officials to judge competitions. 5:00pm drop fires. 6:00pm social and farewell dinner. Awards presented, guest speakers on sugar industry engines.**
Mon 7	**Collect locos and head for home.**

This is a once only event. The occasion will be marked with a limited number of brass participation plates, coffe mugs and hat pins, costs being shared jointly. The clubs and individuals to be visited are 100% behind the event and Wagga Wagga club running day is the only time there will be other locos running on the track. Tour organiser is Andy Roberts who works as a fireman and lately a driver on the Farleigh Mill railways, Mackay in Queensland. He owns two 5" locos, a Perry and an Eimco and has written 2 books on the sugar trains.

For further information, contact Andy Roberts, C/- Eton Post Office, Qld 4741. Ph. (07) 4954 1206 or Fax (07) 4954 1209.

In NSW you can contact Mark Carney on (02) 9644 1131.

Caterpillar Points

Story and photos by Ed Murrell

Drawings for publication by Jim Gray

The Caterpillar Points are something different. They don't have any check rails or frogs so can be used with any wheel standard. The sections can be made to suit your needs — swinging to the right or the left. The 5" gauge rail can be on either side and also a 3$^{1}/_{2}$" gauge rail can be added if desired. *(As re-drawn by AME, the drawings allow for 7$^{1}/_{4}$" and 5" gauges. Dimensions shown are minimal as each builder will want to make them to suit their own circumstances ... Ed)*

Construction

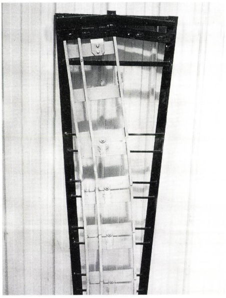
I use 10mm x 20mm mild steel for the rails. There are seven moveable sections, one long and six short. On the long section the rails are 400mm long and on each of the six short sections the rails are 190 mm long.

The rail ends on the No 1 end spreader, are square with the outside rail. On the other end the rails vary in length from 190mm long for the first, minus 2mm for the centre one and minus 3mm for the other outside rail. Where they are placed depends on the direction of the turn-out. To obtain the rail lengths, I use the four-jaw chuck. Face the first one (190mm) to length, face one end of the next one, then stand it on a 2mm shim against the first one and scribe a line across. Do the same with the minus 3mm piece and face the pieces to the scribed line which will be visible whilst turning the end. It is not necessary to shorten the 400mm (moveable end) section rails.

Two pieces of wood are required. with slots to take the rails and hold them to the correct gauge. The No 1 end spreader is then clamped to the end that has the rail ends square with the outside rail. Check to see that it is assembled for the correct turn-out direction. The other end can then be clamped together and the rails welded to the spreaders. To minimise distortion, weld only the bottom of the rails to the edges of the spreaders.

While it is in this position the hinge plate (item 3) can be bolted to No 1 end spreader, then the washer (item 5) tacked with the arc. Do this on the sides only - any further welding might foul the cross pieces. When all the sections have been welded, they can be laid on the angle iron frame with cross pieces to keep them level. A straight edge is placed against the "straight ahead" rail and the rails pushed together with the hinge plates clamped to their respective No 1 end spreaders. If the clearance is correct, all the hinge plates can be welded to the spreaders.

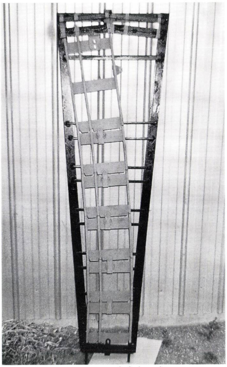
The frame is made from 40 x 40 x 3mm mild steel angle. No skills are needed but it is important to make sure that one side and the narrow end are square (i.e. the straight through line). On the narrow end of the angle frame, I use two pieces of 10mm x 20mm on the flat to which the rails of the main line are welded. The first section can be clamped close to these two cross pieces and a short piece of rail placed against the end of the straight through rail and tacked on one side so that it is easy to remove later. With the line still lined up with the straight edge, the other side rail is treated the same way. The piece of rail is pushed against the end with a 3mm shim between the ends and tacked on one side. Now you can see how the point works. I made the cross pieces from 10 mm square mild steel which need a 3mm step removed from the ends to accommodate the 3mm thick Nos.1 and 2 spreaders. There will be a square cross piece for each plate.



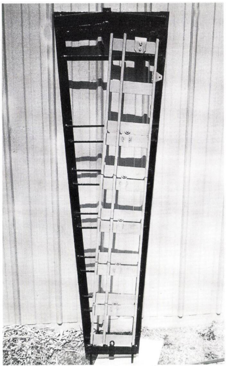
Left hand position after final painting

When this is finished, the wide end can be attended to. The cross pieces can be 10mm x 20mm as for the other end. They need to have a slight curve so cut them across the middle at a slight angle, then if they are turned over you will have a suitable curve, clamp these in place and complete the welding. The rail ends can rest on the curve pieces, but check that the point moves across freely. An offset retaining tongue is bolted to the end spreader of the long movable section. This fits neatly under the curve to prevent the point from lifting. A lug is welded to the appropriate outside rail to which a points lever can be attached.

The completed points modules can be laid on the existing rail where they are to be fitted. The fixed end is clamped and by moving the point across, the angle for the end can be determined. The section is then cut out to accommodate the point. The fixed tail at the moveable end will require a plate welded under it to correspond with a plate on the moveable end to prevent it the whole assembly from lifting.

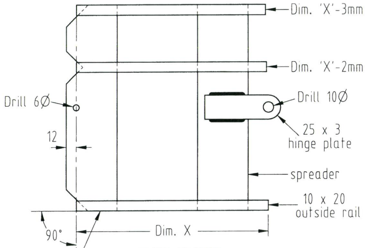


The point set as a left-hand turnout

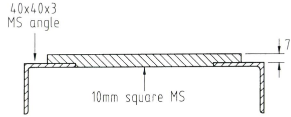


Set for the 'straight ahead' position

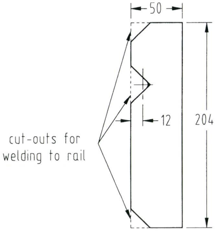
(Drawings on the next two pages)



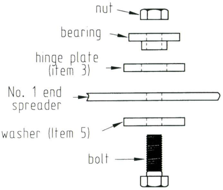
HINGED SECTION
1 with Dim. 'X' = 400mm
6 with Dim. 'X' = 190mm



Section of angle frame showing stepped ends of 10mm square cross pieces



No. 1 END SPREADER
50x3 flat MS



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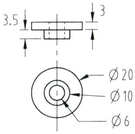

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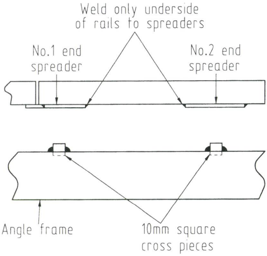
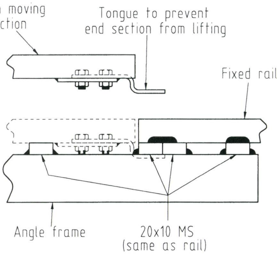
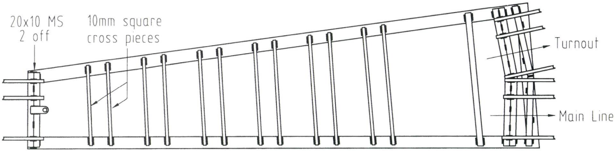
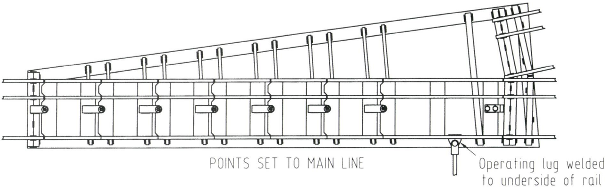


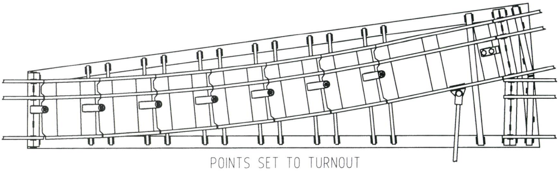




CATERPILLAR POINT FRAME
(40x40 MS angle)



POINTS SET TO MAIN LINE



POINTS SET TO TURNOUT

Tracks 'n' Trees

Gauges and Scales for Garden Railways

by Michael Ragg

At a recent visit to the Bankstown Live Steam Locomotive Society's track at Ruse Park Bankstown, I was asked about Gauges and Scales for Garden Railways by someone interested in modelling in the smaller gauges. There is a fair bit of confusion in this area so I thought it would be a good idea to clear the air.

I define garden railways as being non-passenger-carrying model railways, running on permanent outdoor track in a scenic or garden setting. For this article, while focusing on the scales and gauges popularly used for live steam operations, I'll also briefly cover the many versions of G scale.

Generally three garden railway gauges are used today. The smallest is 0 gauge at 32mm ($1\frac{1}{4}$”) between the rails, next is Gauge 1 at 45mm ($1\frac{3}{4}$”). Gauge 1 is generally regarded as the size where railway modelling seamlessly merges into model engineering, although I'm not sure many model engineers would agree with that. Then there is Gauge 3 at 63.5 mm ($2\frac{1}{2}$”). For each of these gauges there can be a number of scales, depending on whether narrow gauge or standard gauge is modelled. Gauge 2 at 2” never really took off, as it was barely larger than Gauge 1, it must have seemed like a good idea a hundred years ago!

16mil, G1 and G3 - Scale and Gauge Chart				
Common name	**Scale (to foot)**	**Proportion**	**Gauge (mm)**	**Prototype gauge**
16 mil	14 - 16mm	1:19.1	32	2ft
Gauge 1*	10mm 3/8in	1:30.5 1:32	45	metre 3ft 6in
Gauge 3*	13.5mm 17/32in	1:22.6	2-1/2in 63.5mm	4ft 8-1/2in

* in these cases, the common name implies both gauge and scale

G scale chart

Manufacturers	Actual scales	Scale names G LSOL *NMRA*	Prototype gauge track represented for model scales using 45mm gauge					
			56-1/2"	**42"**	**1 metre**	**36"**	**28"**	**24"**
Marklin USA Trains Row and Co	1 : 32	G LS32 *#1*	1 : 32 Std.					
AristoCraft USA Trains	1 : 29	G LS29 *A*	Standard gauge (not to scale)					
AristoCraft Bachmann Hartland Hartford	1 : 24	G LS24 *1/2*		1 : 24n42"				
LGB USA Trains	1 : 22.5	G LS22 *Gn3*			1 : 22.5n1m			
Accucraft Hartford LGB Spectrum [Bachmann]	1 : 20.3	G LS20 *F*				1 : 20n36"		
	1 : 16	G LS16 *3/4*					1 : 12n28	
	1 : 13.5	G LS13 *M*						1 : 13n24"

LSOL is *Large Scale on Line* (www.largescale.com) and represents an effort to simplify the G scale confusion by having the product boxes labelled with the LS code. The original chart was produced by Rick Henderson, Mystic Springs Railway.

What is the difference between Gauge and Scale?

In railroading, gauge is the inside distance between the railheads of the track. Standard gauge is 4’ $8\frac{1}{2}$” wide. Scale refers to the relationship of size between an actual item and a model of the item, usually smaller than the real thing. For example, a 1:24 model is 24 times smaller than the real item. Here in Australia, I see most interest in 16 mil scale and G scale for the narrow gauge modeller and Gauge 1 for the standard gauge enthusiast.

O Gauge

0 gauge (32mm) track is ideal for models of 2ft narrow gauge quarry or industrial railways. This is about the smallest practical size for robust, outdoor live steam operations. The scale is 16mm to the foot (SM32) or ‘16 mil’, as it is popularly known. The Mamod train set is an example of this category. In the U.K. the 16 mil Association (contact details below) actively promotes this scale. This is a good scale for small spaces, as slow running and tight curves are a feature of narrow gauge operations. Excellent garden railways running live steam locos have been built in small courtyard gardens. Locomotives in this scale are mostly fired by alchohol or butane gas but successful coal firing is possible. Control is either manual, or radio control on the regulator and reverser.

This is a good scale for the scratch builder as there is not a lot of commercial equipment available. Although, the growing popularity of this scale has stirred the commercial arena into action and more locomotives and rolling stock are becoming available.

Gauge I narrow gauge

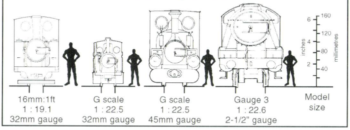
Gauge 1 track running models of 1 metre or 3ft 6in narrow gauge stock. This is a popular scale both here and overseas and narrow gauge modelling on 45mm track is commonly referred to as G scale. One of the biggest misconceptions in garden railway modelling today is that many people think of it as G scale. G scale has been advertised as Garden Scale, Grand Scale, Giant Scale, LGB Scale and Outdoor Scale, along with many other names. Train models are different sizes, some bigger, some smaller, but they are all labeled as G scale. There are seven current scales in G scale modelling; 1:13.7, 1:16, 1:20.3, 1:22.5, 1:24, 1:29, and 1:32. See the G scale table for full comparisons. These models are solid and very stable in the garden environment.

There is a lot of commercial support for this area of the hobby for the live steam and electric railway-modelling enthusiasts.

Gauge I standard gauge

Gauge 1 track running models of standard gauge railways. The scale is 10mm ($\frac{3}{8}$ in): ft. This is very popular in the U.K. and has a strong following here. It is supported by the Gauge 1 Association who provide a full set of plans and instructions for building their Project live steam loco to all who join the association. The common name for this scale is ‘Gauge 1’. The name has evolved to imply both gauge and scale. Most American Gauge 1 standard gauge models are electric powered and supplied by AristoCraft.

Scale Comparisons



In Australia the popular Aster live steam models and Argyle live steam models are available from Argyle Locomotive Works (*see ad on page 64*).

Gauge 3

Gauge 3 track with models based on standard gauge stock. Now we are approaching the people-carrying size and big backyards. Until recently, Gauge 3 was only known as $2^1/_2$" gauge among the model engineering fraternity. The gauge was made popular by L.E. 'Curly" Lawrence, otherwise known as LBSC, in his descriptive series of live steam locomotive building in the British *Model Engineer*. The move by model engineers to $3^1/_2$", 5" and $7^1/_4$" gauges has left $2^1/_2$" gauge out of the limelight. With the fall in popularity of this gauge as a passenger-carrying model it is receiving renewed interest as a garden gauge. Coal firing and fully operational valve gear combined with radio control allows the $2^1/_2$" gauge locomotive to be driven from the lineside. Its use in this regard is being promoted by The Gauge 3 Society in the U.K. These models look quite comfortable next to their G scale and 16 mil narrow gauge cousins, being a similar scale.

Gauge 3 requires a large garden for even a small circuit. Most models have to be scratchbuilt, which means a well-equipped workshop is essential.

Which to use?

Any discussion on scale and gauge usually raises more questions than answers. The question most commonly asked is, "Which gauge and scale should I use for my garden railway?" There is no precscribed answer as a lot depends on personal circumstances and preferences. Many railway modellers simply start with the most convenient option of scale/gauge combination. Others may follow in the footsteps of their friends to share the knowledge and running rights on a variety of layouts. However, regardless of the gauge/scale combination chosen, the construction of the right-of-way remains the same for all!

Contact details:

16mm Association: Brooklands, Stafford Rd., Penkridge Stafford ST195AX. England

G1MRA: PO Box 5128, Northampton NN60YG. England

Gauge 3 Society: The Brick House Church Hill, Kington Magna, Gillingham, Dorset SP85EG. England

Each of these societies provides excellent reference material in their introductory booklets and newsletters.

Local scene

Our garden railway group (mainly steam power) keep in touch through the *Rails in the Garden* newsletter available by subscription from its Editor Michael Bickford on (02) 9456 2303.

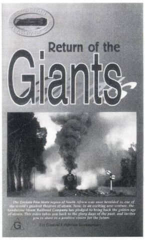
Product Reviews

Return of the Giants

Video produced by Frameline Film & Television for Sandstone Video. 80 mins duration. PAL.

This video sets out to tell the story of the formation and aims of the Sandstone Steam Railroad Company (SSRC) which has been set up to operate on the former Bethlehem to Bloemfontein branch of the South African Railways (Spoornet). It also looks at the railways in this part of the Eastern Free State in their heyday.

In recent years the SAR has gone through the same type of rationalisation and pruning as have railways in many other parts of the world before it. This process has seen the closure of branch lines condsidered uneconomic and the running down of infrastructure in areas of light traffic. The 301k Bethlehem to Bloemfontein branch is such a branch. Not many years ago this line held mainline status and was very busy indeed with steam-hauled freight and passenger trains a common sight. Steam was withdrawn in 1987 and in 10 years the line was reduced to one diesel-hauled freight each way on week days. Along with the decline, buildings deteriorated, the track was overgrown with grass and weeds and rolling stock lay derelict in sidings.


Return of the
Giants
The Eastern Free State region of South Africa was once heralded as one of the world's greatest theatres of steam. Now, in an exciting new venture, the Sandstone Steam Railroad Company has pledged to bring back the golden age of steam. This video takes you back to the glory days of the past, and invites you to share in a positive vision for the future.
G
For General Exhibition Documentary

The video grabs your attention right from the opening shot — a close up sequence of the motion of a class 25NC as it begins to move, accompanied by some well chosen music. Several scenes of steam in black and white then follow for about 2 minutes switching to colour as the title sequence commences. There follows an interesting look back at railways in South Africa, with some excellent footage, and we then see how the rise in popularity of road transport has brought about a decline in the railways.

We are treated to some great footage of steam trains in magnificent surroundings, a major segment of which is a 25NC steaming across the prairies with the constant backdrop of the mountain range, the appearance of which gives the Sandstone area its name. We get a very detailed look at a locomotive depot in steam days with men at work doing all the chores not usually seen on film, scenes like emptying wagons of coal up on the coal stage while locos fill their tenders down below. We also spend the day with a driver from the time he gets the call at 2am until he arrives in Bloemfontein with a parcels train behind his 25NC. He has made staff exchanging into an interesting operation at full speed and apparently it takes 30 seconds to cook sausages at 1000°C.

The SSRC search for locos and rolling stock is well documented.. In 1997 they acquired three dilapidated Garratts, one of which has been restored to working order. It is GMAM No. 4079 and we see it performing its load trials in 1997 with 1000 tons of copper in tow. What a sight!

One of the first tasks the SSRC faced was the run down infrastructure and in some cases non existent as the result of fires. The restoration of and building of replicas where required is well documented. The whole area is very economically depressed and the local population are looking to the revival of the railway to bring employment. The farmers are supporting it with freight and because of the location in South africa, the tourist potential is believed to be enormous. The challenges are many, but you get the feeling that this company will succeed.

The camera work in this video is of a very high standard throughout, with none of the jerkiness or chopped scenes which appear in many railway videos.

The music and commentary are also better than most that I have seen. The music is not constant, but seems to come in at just the right places. It is a mixture of the dramatic and traditional African and most pleasant. The commentary is very informative, well presented but not continuous. Like the music, it comes in when it is needed and the rest of the time one can hear the sounds of the locomotives and background voices and machinery.

The only criticsm that I would make is that it does tend to jump back and forwards in some places between the past and the present and on a couple of occasions I became confused. (Maybe that has nothing to do with the video!)

Overall I would rate this as one of the

better rail videos I have seen, and in some aspects even inspirational.

Return of the Giants

Price: $49.95 including postage and packing within Australia

Available from: AME Retail, PO Box 355, Kooringal. NSW 2650. Ph/fax orders (02) 6926 4554

David Proctor

The Great 100 Working

Another video produced by Frameline Film & Television for Sandstone Video. 90 minutes duration. PAL.

April 1999 saw a huge celebration take place in the Eastern Free State of South Africa. To mark the centenary of the Anglo-Boer War, a *Guiness Book of Records* world record attempt was embarked on to have the greatest number of different antique machines ploughing on the same land at the same time (the number aimed for was 100). This event also coincided with the inaugural run of a fully restored 2 foot gauge steam railway some 7 kilometres in length. The scene of this huge undertaking was on a 6000ha wheat farm owned by Sandstone Estates near Hoekfontein.

The video starts out by showing an annual local vintage machinery show which has grown to become a major event. We see traction engines, steam rollers, portable engines, tractors, trucks and stationery engines. In fact it has become the location of the largest gathering of traction engines in South Africa.

From this beginning, we are transported to Hoekfontein to watch preparations for the *Great 100 Working* as the event is called. We see the construction of the 2ft gauge railway, with its 400 tons of rail and 7000 sleepers, relocated from a defunct museum in Midmar, and the old machinery and trucks used by the contractor. NGG16 class Garratt No. 152 in immaculate maroon is shown being loaded onto road transport, transported and unloaded onto the railway. It looks magnificent.

On the days leading up the the Great 100 Working, we see machinery of all types being brought in from around South Africa. The first day of the event arrives and the farm is teeming with activity as all types of machines burst into life, or in somes coaxed. Many of these machines are quite rare.

A 1927 Super Sentinal tractor trundles by followed closely by a 1920 Marshall traction engine, brought out from England for the event. It is a radial valve compound, one of only two known to exist. A 1913 McLaren, believed to be the only superheated survivor, is next as the Garratt puffs by with a train in the background. An immaculate John Deere Model 60 High Crop tractor, one of only 23 ever manufactured, was bought as scrap by its owner.

In addition to the agricultural machinery, we are treated to a renactment of a Boer War scene, vintage aircraft, a mainline rail excursion (behind a GMAM Garratt), and oxen ploughing. And the record attempt? 106 tractors ploughing together is most impressive from the ground and the air.

Like the other video reveiwed in these pages, this is a quality production. The camera work is a consistently high standard, whether it is showing the magnificent huge landscape, aerial views or close-ups of some detail on one of the machines. The music and commentary, again, add to the overall effect and are used only when needed.

I look forward to seeing more work from this outstanding production team.

The Great 100 Working

Price: $49.95 including postage and packing within Australia

Available from: AME Retail, PO Box 355, Kooringal. NSW 2650. Ph/fax orders (02) 6926 4554

David Proctor

New Subscription Form

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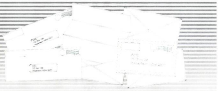

Model wheelchair wanted

Sir,

We wonder if there is an Australian Model Engineering reader, anywhere in Australia, who would like the challenge of building a scale model radio-controlled electric wheelchair to a 1/10th or similar scale?

Link is the Australian award-winning magazine that examines issues from a cross-disability perspective. In an effort to promote our magazine we often attend trade shows, conferences and exhibitions. We are also involved in public talks, etc.

For some time we have thought that it would be a great draw-card to have a scale model wheelchair.

We would be able to organise the short-term loan of an electric wheelchair, pay for all materials and provide a modest reimbursement for the time involved.

Jeff Heath
Editor
Link Magazine
GPO Box 909, Adelaide. SA 5001.
Ph. (08) 8377 2295, Fax (08) 8296 1688
email: link@ability-network.com.au

A happy newcomer

Sir,

I am new to the hobby of live steam, just four short months. Although I have been wandering around the edge of the hobby for about thirty years or so, I never really took the plunge as I knew the amount of time and commitment needed to fully construct a live steam locomotive. On retiring from BHP after thirty six years and one week I, and a friend of mine, decided that live steam would be able to keep us occupied for a while.

I went along to the Illawarra Live Steam monthly club meeting in September and even though I knew no one, I was welcomed. Several of the members there came up to me and introduced themselves and made me feel at home. Other hobbies that I have been in have not been this welcoming to new members — it was a new experience.

Well, I bought a pre-loved locomotive in mid October, wanting to use it as a learning tool to learn the firing, driving, general maintenance and modification as I built my own loco. And then I attended the Wagga Wagga Invitation Run.

We arrived at the track about 1:00pm Friday and the place was hopping! I registered and got all of the necessary paperwork out of the way then ...WOW! I have never had so much fun with all of my clothes on before in my life! The general atmosphere was fantastic, even though the weather left a little to be desired, with rain showers on and off through Friday and Saturday. I had loco problems, and the assistance came from everywhere. The loan of some small metric spanners, because I'd left mine at home, the loan of an air compressor and/or blower as I'd forgotten to ask if compressed air was available, and so on.

I finally got the loco operational on Saturday morning with the assistance of some friendly, knowledgeable and capable live steamers. I made two laps of the track under my own power and then pulled into Loco due to low char and not being too sure how much water was in the tender. Sunday dawned and not wanting to rush and get involved in the general traffic, I 'snuck' over to the Signal Box and had a quick word with the lads on duty up there, the result, Loco #78 had a couple of laps around the track without getting in everyone's way.

To those that assisted me — Jim, David, Lionel, Bob, John, Ray, Ken, Allan and several others, sorry but I missed their names and everyone's surname, my heartfelt thanks. And to the Wagga Wagga SME, I'll definitely be coming back next year. I can't thank you enough for the assistance to myself personally and to the general running of the whole weekend.

John Simon
New South Wales

Support your own

Sir,

May I congratulate the AME team on the latest issue of the magazine. As a subscriber to the magazine from its inception I can look back at its evolution and note that in a relatively short space of time you have produced a publication that now lacks nothing in comparison to its overseas contemporaries.

I am also a long time subscriber to the equivalent UK magazine and occasionally to the US one, but as of now I am happy to allow my subscription to those magazines to lapse. Money has something to do with that decision but I am more than satisfied with our own AME.

While on the subject of the UK magazine (you know the one I mean) I am continually perplexed by the number of contributions appearing attributed to Australian and NZ authors. Don't they know we have our own magazine? Surely they don't pay all that much for contributions or perhaps they are ex-patriots trying to impress the folks back home with their exploits in the colonies, whatever, come on guys, support the local product.

The current standard of AME is a credit to the contributors and the editorial team. It provides an excellent balance of topics and the presentation of drawings and photographs is to a very high standard with colour pages as a bonus. Congratulations on a job well done and looking forward to the continuing success of AME.

Alan Holt
Western Australia

(Alan, thankyou for your support. It is unfortunate that we are not yet in a position to pay our authors as some larger circulating magazines do. If our readers continue to support us in the way they have been, and our circulation continues to increase at its present rate, perhaps the day when we can afford to pay something will not be that far away ... ed.)

Stirling cycle engines

Sir,

I have been making hot air/Stirling 'cycle' engines since 1981 with various levels of success. 12 months ago I started to build a 121mm bore engine which I wanted to use in a 15ft open boat. The boat engine is finished and is making 45 watts, however I don't like it so there is another engine under way. Hopefully it will be "prettier" sitting in a classic boat. This engine is double acting simple, sort of like a double Robinson.

Are there any other people or groups in your readership building these engines who would like to correspond.

Steve Truscott
158 Regal Way, Valentine, NSW 2280
email: btruscott@bigpond.com

More on beginners

Sir,

Really enjoyed the article on PS *Waimarie*. Love to see some of the old stuff restored before it deteriorates beyond restoration.

Re the letter from Anthony Ciach. My comment would be that no magazine is ever meant to be a basic primer on the subject matter involved. That is what BOOKS are for. There are a number of very good books available to teach both basic model engineering and model locomotive construction. Most are advertised in AME. If Mr Ciach's budget will not permit acquisition of said 2 or 3 basic books, I fail to see how he can ever afford the components for a $7^1/_4$" gauge locomotive.

Magazines are for enhancing knowledge levels, supplying plans, supplying updated information of basic or advanced knowledge book subjects. This does not only apply to model engineering subjects. The same holds true of any hobby or profession. You would not expect to learn the basics of automobile manufacturing from an automotive manufacturing magazine nor electrical engineering from and electrical engineering magazine. You will not learn basic engine overhaul from a hot rod magazine.

I have found very few clubs of any hobby that designate specific people who are "greeters" who specifically look after new or potential members to make them feel welcome and help them with introductions, especially to people with similar interests. Everyone always wants to be having fun and no one wants to do the necessary work. This is definitely not something that affects only model engineering clubs. Unfortunately, truth is kids are generally at the bottom of the attention list instead of where they belong at the top.

Jon Kutz

Minnesota, USA

Thank you, Les Mouat

Sir,

My recent request to Les, cap in hand, requesting some 17 Back Issues of AME in an effort to complete my collection of this fine magazine right from the very first issue. (No. 1 up to issue 87 is now complete!)

What surprised me was a$15.00 refund included with a rather large, bulky package of the past issues, which I read from cover to cover, needless to say, thus keeping up with all the news in recent times due to missing out within a pensioner's financial restraints. The $15.00 was a generous refund on postage which I had included as advertised in the Back Issues listing.

May I through this letter sincerely thank AME for your honesty in forwarding this refund, which is much appreciated by this pensioner subscriber! Now that I am back in the fold as a regular subscriber (and hopefully a regular contributor of articles from beautiful, downtown Cobden way!), I look forward to adding future issues of AME to an already impressive collection. Yours in good steaming.

Ron May

Victoria

(Welcome back, Ron, and on behalf of Les and AME, thank you for your kind comments. We always try to look after our readers, though some times it is easier than others. The back issues is one example — the price we advertise includes postage at what it costs per magazine to post out. When a large order such as yours is being posted out, the amount Australia Post charges for the parcel can come to less than what it would cost for individual magazines, depending on the weight. When that happens, Les, like the rest of us prefers our readers to get the benefit of the saving ... Ed.)

A tale fo co-operation and fellowship

Sir,

Over the past 12 months via the Live Steam e-mail based users list run by Keith Mansion in Jamaica, West Indies, I started corresponding with Russell Dunn, the wandering mining engineer formally of Tasmania now residing in Perth, Western Australia. Russell indicated that he wanted to build a *Willamette* Shay and could I help him find Paul Getz of Port Angeles, Washington who happens to have a full size Willamette Shay in his back yard and had written a book on the subject a few years ago. Using contacts in our local live steam club the Kitsap Live Steamers, I asked fellow club members Dennis Weaver and Howard Springer if they could help. Howard needed less than 24 hours to come up with Mr. Getz's address and phone number!

Another member of the Kitsap Live Steamers, Geoff Robinson who is building a $1^1/_2$" scale UP Big Boy from Roger Goldman castings had indicated he wanted to build a 1.6" scale NSW AD60 Garratt as his next project. Geoff is an engineer on oil tankers running between Alaska and the west coast ports of the USA and is away from home for two months at a time. I therefore started asking Russell about the AD60's. He was able to find me sources for photos, videos and books on the subject. This correspondence also led me to two other Garratt enthusiasts in Australia, Bob Farquhar whose stories of driving and firing AD60's between 1959 and 1972 are worthy of publication on their own and Gerardus Mol who has been associated with AD60 6029 and is currently building a different model of Garratt in $1^1/_2$" scale.

Russell also bought me a year's subscription to the AME, by far the best live steam magazine on the planet. The third copy I received, issue number 87, contained a for sale advertisement for a partially complete $1^1/_2$" scale AD60. I sent Russell and Bob a quick e-mail. At this point I was really only interested in finding out more about drawings and casting moulds etc. for Geoff.

Russell, the wandering mining engineer, sent back a quick e-mail saying he was 80 miles from the seller's house in NSW on assignment and offered to pop down over the weekend and take a look. Bob sends a note back saying he knows the builder who, he reports, does excellent work. Russell sends another e-mail the following week with a glowing report about the workmanship and the reasons why the builder could not finish the loco.

Geoff however, was not really interested in the loco, as his goal was a 1.6" scale version of an AD60 5-10 years in the future. I was about to purchase a set of castings from Roger Goldman for a UP Challenger and pool my resources with Geoff as the Big Boy and Challenger have many common parts. Russell sent more e-mails detailing the work completed and what was needed to complete the project.

At this point I needed to decide, do I want a Challenger or should I take this opportunity to obtain a Garratt, another loco type that has always fascinated me. The second consideration was the fact that the Garrett, because of the work already done, could be completed on a much more compressed time scale.

I decided to call the seller and have a chat. We discussed the weight and dimensions of the loco etc; I then ran some exchange rate comparisons with Australian and US dollars and checked the cost of shipping. The seller and I agreed to a price and to have the loco professionally crated. The loco will arrive in Seattle on January 25th 2000.

I'm amazed at the fellowship and friendships being built around the world using e-mail and the web. It's a really small world that we live in. Russell and Bob are visiting in 2000 for the big IBLS meeting. Russell will be visiting with Paul Getz.

I'll keep you posted on my progress with the AD60.

Trevor Heath

Tacoma, Washington USA

Superelevation and electrics

Sir,

A reply to Warwick and Stan Allison (*Letter Box* issue 88) and to Stan's request for input re *Sparks 'n' Arcs.*

Thankyou both for replies on superelevation. I did use a high speed for a critical speed in calculations as suggested by Warwick to get a little comment on safety because, as we have all noticed at track meets, there is always the driver, still young at heart, who wants to "see what she'll do" or see if he can break a track record because you still hear speed records for certain tracks mentioned.

Now regarding Stan's request for feedback on his *Sparks 'n' Arcs.* Stan is to be commended for writing his articles in terms the layman (or slow old blokes like me) can understand; his articles to me are most readable. I have thought over years of building an electric or diesel electric model, a next step after steam and (after all) it is 2000 not 1900 — something for the next generation of model engineers.

May I suggest to Stan some articles for the layman on safety, a simple handbook on reading circuit diagrams, what represents a resistor, how you tell the strength of a resistor, what represents a motor, a

Letterbox Contributions

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Please **type or clearly print** your letters, as script is often difficult to interpret. Due to popularity of Letter Box and limited space, letters of **400 words or less** will have a better chance of being published.

transformer, circuit breaker (or switch to some) and preferences for using series circuits to parallel circuits. I'm not looking for Stan to write a thesis or a text book, but something to keep us not so aware blokes interested and perhaps a needle not to give up. As a matter of interest and thanks to Brian Carter for being so thoughtful and courteous enough some years ago, not to publish my thoughts on building a model diesel electric using one of those small 240 volt petrol driven generators as a power source for driving sewing machine motors as traction motors (I admit I should have had better sense). Brian courteously reminded me 12V or 24V was the way to go for obvious reasons — the disadvantages of sewing machine motors, and above all, the dangers involved with 240V for models (One flash and you're ash!).

Thanks fellas
Kevin Bruderlin
New South Wales

(Kevin, you have made some excellent suggestions in your letter. If any of our readers would like to put pen to paper on any of these topics, or other elctrical matters, please do so — don't leave it all to Stan to write. His aim to date, has been to keep it fairly simple and in general terms to serve as a general introduction to the topic of electric traction and Kevin's comments would indicate that Stan has 'hit the mark' ... ed.)

A Modification of the Lathe Clutch

Story and photos by Peter Dawes

My original description of a lathe clutch in AME Nov/Dec 1996 (issue No 69, page 31) was specifically oriented to a geared head lathe such as the AL960B lathe. I mentioned then that the design would have to be modified if the motor was mounted on a separate stand.

Wal Thorncraft of the Orange Society of Model Engineers has done exactly that. His separate stand is quite thin front to back and so close to the back of the lathe it's almost touching. He has managed to arrange it so that the motor is almost in the same position it was in originally yet it is sitting on a support plate pivoted independently of the lathe.

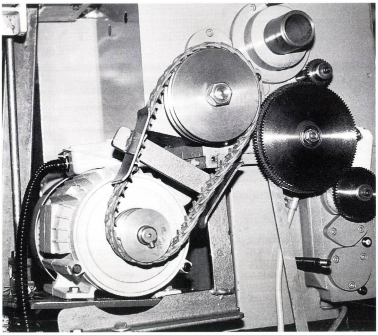
His lathe differs from the AL960B in that it has a twin sheave single speed "A" belt drive instead of a single sheave two speed "B" section drive. The drive is clearly shown in one of the photos. His lathe is similar to the AL1000 geared head lathe listed by Hare and Forbes.

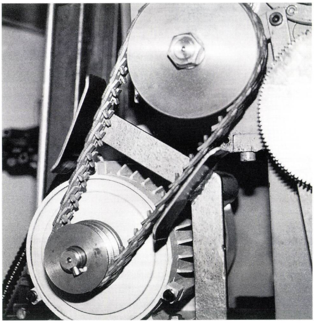
He wanted the clutch handle on the right side so he put a pair of substantial posts made from 50x25mm RHS on the top of his motor stand, passing up to where they support a heavy clutch shaft and mechanism. These posts are visible as the square grey posts leaning slightly forward at the back of the main body of the lathe.

He made two other modifications to the design. He used a short heavy compression spring instead of a tension spring to counterbalance the motor. It has a screw mechanism adjustable from underneath to provide adjustment instead of from the top with a tension spring. Unfortunately this cannot be shown in a photo. He avoided the need for left and right handed screw threads for the "toggle" to adjust the lifting arm, by passing the latter through a U-shaped bracket with just plain right hand nuts above and below so that they can be adjusted and tightened through the opening in the "U". The bottom ends of the arms of the U-bracket are hinged to the support frame so it can follow the direction of the lifting arm as it rises or falls. In the original design there was a hinge joint at the bottom of the lifting arm to provide this movement. The U-bracket is just visible in the first photo, being partly concealed by the black cable going to the motor. The lifting arm itself, of 12mm round steel is visible as the bright steel rod in front of the nearer post.

The second modification was to use a pair of simple flat plate guides to constrain the belt instead of the original roller guides. I should repeat that this constraint on the belt is a vital part of the operation of the clutch. His method only works because he has a single speed pulley and doesn't have to worry about a "virtual crossover point". The flat guides take up less room to the sides of the belts than rollers and they were easier to make. So far he has found that they give no trouble.

Rather than use rubber belts he is using two 'A' section belts made of adjustable link belting (eg. similar to Fenner "Power Twist" belting). The only effect he notices from that is that the links make a slight clicking sound against the guides just before the belt comes to rest. This is caused by the backs of the individual links slapping the guides briefly before the belt stops rotating.


Side view with the clutch released


Clutch engaged and belt tight. Note belt well away from guides

Now this has raised some interesting points. Firstly the roller guide is a "point contact" guide in contrast to his, so link belts will probably not work satisfactorily with it. On the other hand, a long fixed guide is probably not suitable for two-speed systems because of the crossover effect. It leads us to formulate two simple rules:-

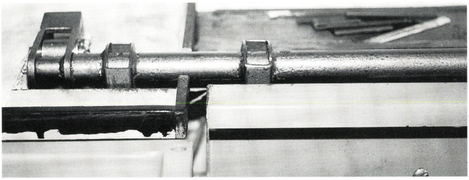
1. Don't use adjustable link belts with two-speed drives,
2. Don't use long static guides with two-speed systems.

In all other cases it shouldn't matter which way it is made. Note that in both these lathes, the pulleys are open one side so that continuous rubber belts can be used without any difficulty. It's not as if we are obliged to use adjustable link belting.

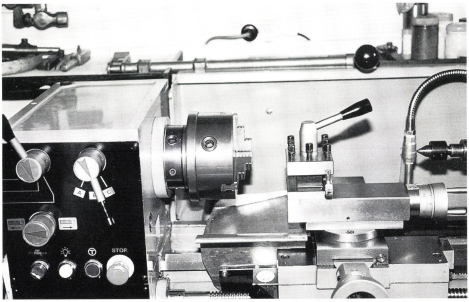
He has beefed up the knee mechanism. The "stroke" is still 1$\frac{3}{16}$ inches, and his operating shaft is $\frac{3}{4}$", but otherwise it is the same and works on the same principle.

He finds there is a small bounce in the handle when power is first switched on, but it is not significant. In fact it is much less than in my version. I don't know the reason unless it's because Wal's system is made of heavier steel parts all round. That means there is more inertia to resist the motor's kick.

He says that the clutch has made a tremendous difference to the convenience of working with the lathe. Builders who are interested in following up Wal's version can contact him on (02) 6362 6925.



Operating shaft — top view



The relationship of the operating shaft to the lathe as a whole. The clutch is in the released position here and the handle is pointing directly forward. To engage, it is pushed up and back about 90°, just as in the original design.

End Mill Moribundas

by Peter Johnson

Photos by the author, drawings for publication by Jim Gray

The photo (**photo 1**) shows all too well the chipped teeth and broken cutters one experiences from time to time. The writer's machine is over 12 years old but always had a treacherous inclination to break end mills for no apparent reason. All sorts of excuses were 'invented' for this trait — springy main column, non-preci-

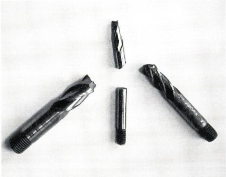


Photo 1

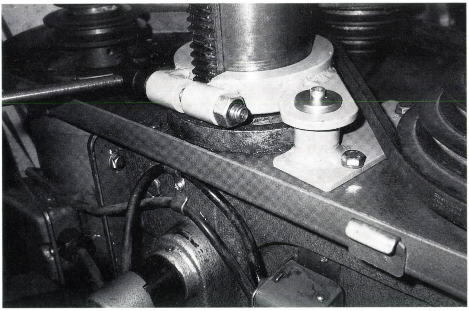
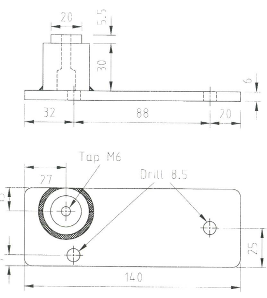
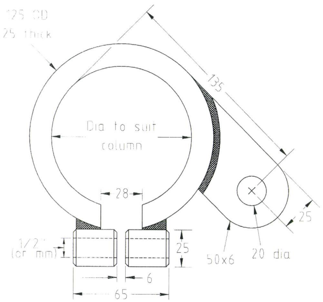


Photo 2



TORQUE ARM ANCHOR



AUXILIARY CLAMP

sion slides, quill a bit on the light side and so on. Both body-clamp screws had been beefed up with longish tommy bars and felt suitably solid when tightened so never got on the list of suspects.

But the time had come to find out why? A simple test was carried out by putting a steel block in the machine vice and pressing it against the cutter spindle using the table feed screw. The column had been cleaned and was well clamped with the tommy bars.

It was found to be all too easy to 'pivot' the body around the column. Here then, was the cause of all the troubles. The clamps were just not holding anywhere near tight enough. What was needed was a device to clamp the body and column together when required. **Photo 2** shows how this was done.

The sketches made for the machine could provide guidance for similar machines so have been included. Several details need attention when making it up. The clamp ring needs to clear the drive belt when it's on the largest pulley. The foot on the torque arm anchor also needs to slant for the same reason. (See **photo 3**)

To get the two foot-bolt holes safely into the flange inside the body (which is not very wide), drill a couple of pilot holes first. Look inside with a torch and make any corrections needed before drilling and tapping the bolt holes. It goes without saying that final boring of the clamp be done after all the bits are welded together.

In future it will probably be the operator and not the machine that breaks endmills as the body to column clamping effect is rock solid.

If the tommy bar lock is used instead of a spanner then the belt guard will need slotting to allow it to swing.

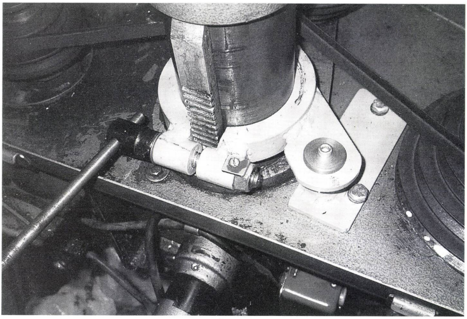
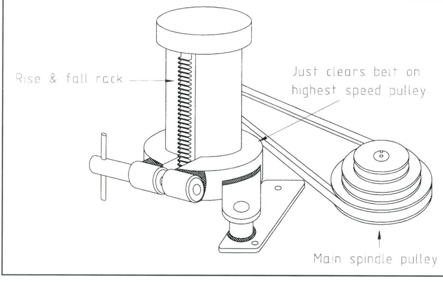


Photo 3



News Desk

with David Proctor

Hello! We have a very short Newsdesk this issue due to space limitations.

Correction

Bottom drawing, page 14 in the last issue — the 18mm wheel dimension should read 16mm.

U.S.A. SD-60 locos

Do any readers have access to photos or information on U.S. loco type SD-60 and also F-40/45. We are researching a local variant and offers of help in this area would be gratefully accepted. Please contact the AME office by phone/fax or email.

AME in newsagents

Has your AME not been regularly available from your local newsagent lately. There appear to be some inconsistencies in newsagent distribution from mid last year onwards and we would like to hear from you if you have had problems obtaining your copy.

Modeller requires assistance

A request for help from Keith Chapman who has owned a vertical steam boiler for many years which has fallen into disrepair and only recently been rediscovered. He is seeking help with dimensions for the cylinder, piston and flywheel. If any reader would like to assist, Keith can be contacted at: PO Box 1033, Traralgon Vic. 3844 or on email at:

Keith_Chapman@brambles.com.au

Page 5 *Comment*

If you would like to contribute an item for the editorial page, please do so. You all hold opinions on most issues, so why not share them in your magazine? If you are unsure, or need help, give me a call.

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Until next time, remember — depression is merely anger without enthusiasm.

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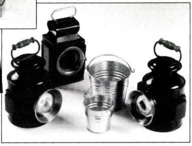

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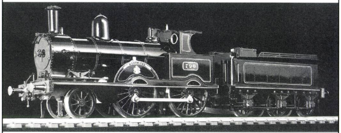

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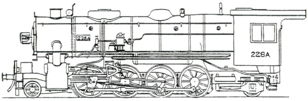

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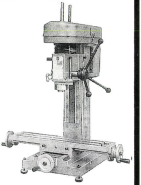

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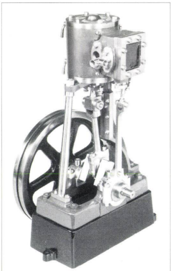

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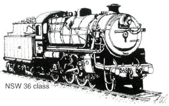

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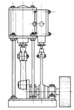

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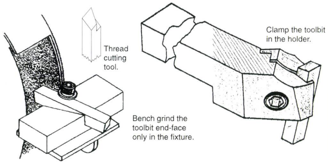
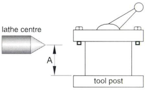

Thread cutting tool.
Clamp the toolbit in the holder.
Bench grind the toolbit end-face only in the fixture.

Each kit consists of the toolholder, grinding fixture, Tool Bit, Allen key and detailed instructions.

Type	L.W.H.	Dim A	Sq. tool bit	Price	Postage
T6	52 x 9.5 x 9.5	6mm (1/4")	1/8"	$75	All types:
A8	77 x 12 x 11.5	8mm (5/16")	1/4"	$98	A$5
A9.5	77 x 12 x 13	9.5mm (3/8")	1/4"	$98	in Aust
B16	77 x 14.3 x 15	16mm (5/8")	1/4"	$98	& NZ

Roughing and finish cuts, end and shoulder facing, plus 55 or 60 degree threading. All from a standard square HSS toolbit! Before ordering, measure the height from the tool-rest landing to the lathe centre (Dim A on sketch). Select the kit that suits your application.



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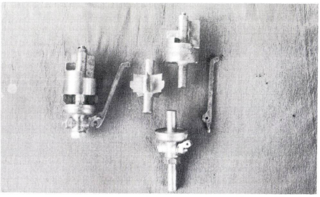

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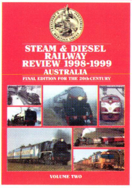
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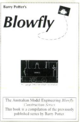
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